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ESSENTIALS OF DIETETICS

ESSENTIALS OF DIETETICS

A TEXTBOOK FOR NURSES

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PREFACE

The purpose of this book is to furnish in a simple, easily read, and comprehensible form, a textbook for the nurse in the training school. The book is also intended to serve the nurse as a valuable book of reference when she has graduated from her school and must rely more strongly upon herself. As the condition of her patient depends as much upon the food he receives as upon the medical or surgical treatment given, dietetics can not fail to be of great value to the nurse. There is practically no illness in which diet does not play an important part. A knowledge of it is also valuable in maintaining good health when one does possess it.

The book has been divided into two parts. In the first part the composition of food, its nutrient value, and its utilization by the body has been discussed. In the second part the foods which are beneficial in certain diseased conditions are given, and the principles underlying their use are explained.

Material used in the preparation of this book has been obtained from the best authorities available upon the subject of dietetics. Whenever exact quotations have been used, the name of the authority has been given. Other material has been the result of experience obtained in the feeding of actual cases in hospital work and in lectures given to nurses.

MAUDE A. PERRY.

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ESSENTIALS OF DIETETICS

PART I

CHAPTER I

FOOD

Outline.—

- I. Classification.
    - (a) Physical Properties.
    - (b) Source.
    - (c) Composition.
    - (d) Function.
- II. Computation of Value.
- III. Tests for Value.

Study Helps.

Dietetics is the science which teaches the correct feeding of any individual, in health or in disease. All people can not eat the same foods and derive the same benefit from them; in fact, many things which are beneficial to one person are actually harmful to some one else. The dietaries of all people are composed of foods and food adjuncts. A food is anything which, when taken into the body, is capable of building or repairing tissue or of supplying heat and energy for nervous or muscular activity. Food adjuncts are accessories to the diet which, although they possess no food value, are often very useful in the preparation of many foods as they make them more palatable. Sometimes they stimulate flow of digestive juices, and increase the appetite. Chicken is a food; tea, pepper and spices are food adjuncts.

Of the many chemical elements found in nature, thirteen enter into the composition of the body in relatively large quantities and ten others are sometimes found in small amounts. Moss gives the following approximate chemical analysis of a man 5 feet 8 inches in height and weighing 148 pounds:

Oxygen	92	lb.	Potassium	.34	lb.
Nitrogen	4.6	"	Fluorine	.02	"
Sulphur	.24	"	Carbon	31.6	"
Iron	.02	"	Calcium	2.8	"
Hydrogen	14.6	"	Sodium	.12	"
Phosphorus	1.4	"	Magnesium	.04	"
Chlorine	.12	"			
			Total	148	lb.

All of these substances must be supplied to the body by the food which we eat and the oxygen which we breathe. These elements must be kept in their proper proportion if health is maintained.

Foods may be classified according to (1) their physical properties, (2) their source, (3) their chemical composition, (4) their function.

(1) Food is solid, semisolid or liquid.

(2) Food is of animal, vegetable or mineral origin. Beef is of animal, potatoes are of vegetable and salt is of mineral origin.

(3) Foods are either organic or inorganic. Organic foods are foods which have had life, either animal or vegetable. Inorganic foods are foods without life, water

and salts. Organic foods are subdivided into two classes, foods containing nitrogen and those which do not. They are called nitrogenous and non-nitrogenous foods. According to their chemical analysis all foods are divided into five groups called food nutrients. These are proteins, fats, carbohydrates, water and mineral matters.

Organic Foods	Nitrogenous	Proteids
	Non-nitrogenous	Carbohydrates Fats
Inorganic Foods	Mineral matter Water	

The chemical composition of proteids is a combination of carbon, hydrogen, nitrogen, oxygen, sulphur and sometimes phosphorus. Some of the other food nutrients contain some of the same elements, but this class is the only one containing nitrogen in a form available for body use. Carbohydrates contain carbon, hydrogen and oxygen. Hydrogen and oxygen are always found in these in the proportion to form water as the name implies, carbohydrate. Fats are composed of hydrogen and oxygen and carbon and are sometimes called the hydrocarbons. Water contains hydrogen and oxygen, two parts of hydrogen to one of oxygen. The minerals are those named on page 12.

(4) Foods have two important functions. (a) They must build or repair tissue and (b) they must furnish material for heat and energy production. Proteids, mineral matters, and water belong to the first class; pro-

teids, carbohydrates, and fats are heat and energy producers.

The air is taken into the body and the oxygen from it burns the food and from this we have our heat and energy production. This process is called *oxidation*. The body is constantly changing, old tissue is being destroyed and new tissue constructed from the food which we eat. This process of changing is called *metabolism*. It is a series of constructive and destructive processes. During the period of growth the body of an individual increases in weight from fifteen to twenty times its birth weight. In old age, except in cases of accident or sickness in which tissues are greatly depleted, growth ceases; but as the tissues are constantly changing there is never a time when building material can be omitted from the diet.

In order to compute the food value of various nutrients the calorie was chosen. A calorie is the amount of heat required to raise the temperature of one kilogram of water 1° C. This is almost the same as the amount required to raise the temperature of one pound of water 4° F. As most of us are more familiar with the Fahrenheit than the Centigrade thermometer, the latter is preferable for our use. The food value of one gram of proteid is 4.1 calories, of one gram of carbohydrate 4.1 calories, of one gram of fat is 9.3 calories. For example the edible portion of an average sized egg weighs about 45 grams or 1.5 ounces; about 12% of this is proteid, 9% fat, ½% mineral matter, 67% water. The rest of the egg is the shell or inedible matter. From these percentages we find that an egg contains approximately 5.4 grams of proteid, 4 grams of fat, 30 grams of water and .2 grams of salts. Computing its food value from the values given for each nutrient, we find that the food value of the egg is about 60 calories. Many authorities give a much higher value for an egg, but one can see that the size of the egg would be the determining factor. As this subject will be taken up in a later chapter, after a better knowledge of all food nutrients has been obtained, this one example will suffice here.

Many foods contain nutritive value and yet for some people they are not beneficial, but actually harmful. Personal idiosyncrasy may cause even an egg to act almost as a poison to a person, yet we could not condemn the egg and say that it is not a valuable food for most people.

The general tests which may be applied to all foods to determine their food value may be answered by three questions:

I. What percentage of food nutrients does the food contain and what is its caloric value?

II. Is the food readily digested and easily absorbed?

III. Can the food be bought for a price commensurate with its food value?

We have very few perfect foods. Milk is said to be a perfect food for infants, but not for adults as a sole article of diet. A perfect food must contain all the food nutrients in their proper proportion in a moderate compass, and be easily digested and absorbed and yet furnish intestinal bulk. For an adult there is no one food which will meet all the needs of the body, so we say that the best diet is a mixed diet. This is one in which foods of different kinds are used so that in every day's dietary the body obtains the right amount of each nutrient needed to maintain health.

Study Helps

Define dietetics.

What is a food?

What is oxidation?

What is a calorie?

What is metabolism?

Name some important chemical elements of which the body is composed.

How are these elements supplied to the body?

From what kingdoms do we derive our food?

Give an example of each.

Name the food nutrients.

What is the caloric value of each nutrient?

What are the uses of foods?

What elements do carbohydrates contain?

What is an easy way to remember this?

CHAPTER II

FACTORS AFFECTING FOOD REQUIREMENT

Outline.—

- I. Work and Rest.
  - Some Dietary Standards.
- II. Age and Sex.
  - (a) Children.
  - (b) Adults in Prime of Life.
  - (c) Aged People.
- III. Weight and Build.
- IV. Climate and Season.
- V. Health and Disease.

Study Helps.

Many factors influence the food requirement of individuals. Some of the most important are:

I. Work and rest.
II. Age and sex.
III. Weight and build.
IV. Climate and season.
V. Health and disease.

I. Whether an individual is asleep or awake the internal work of the body must continue, but the energy expended by the body when at rest or asleep is much less than when a person is doing mental or physical work. Energy must be expended for respiration, digestion, circulation and intracellular activity. For a man of average weight (154 lb.) 1600-2000 calories of food are needed for internal activities alone. Muscular activity increases the need of the body according to the kind of work which a man or woman does. A man doing very hard muscular labor would need more food than a man only moderately active and doing mental work. He would also need a different kind of dietary.

Atwater gives the following table to show this:

1. A man without muscular work........	needs	2700	calories.
2. A man doing light muscular work......	"	3000	"
3. A man doing moderate muscular work..	"	3500	"
4. A man doing severe muscular work.....	"	4000	"

This is much the same as the English standard which gives:

1. Clerk at desk work	needs	2500	calories.
2. Professional worker (doctor)...........	"	2631	"
3. A man doing moderate muscular work..	"	3121	"
4. A man doing severe muscular work.....	"	3659	"
5. A man at hard labor (blacksmith)......	"	5213	"

Most authorities give the need of a woman as .8 of that of a man. A person at rest may do well and even gain weight on a very low diet. All the food nutrients should be lowered equally for such a diet.

The standard daily dietary for an adult male at ordinary work given by different authorities, varies considerably. Atwater gives as his need 125 gm. of proteid, 125 gm. of fats, and 450 gm. of carbohydrate; Voit gives 118 gm. of proteid, 56 gm. of fat, 500 gm. of carbohydrate. The principal variation here is in the amount of fat. However, Chittenden would reduce the protein to just about one half of the amount given by either Atwater or Voit. The Atwater standard is the one most generally used in this country for computation of dietaries.

The man doing hard muscular labor must have different food from the man doing clerical work, or any other brain worker. The brain worker does not need so large a quantity of food, as this would hinder his work by taking a large supply of blood for digestive processes and a large amount of nervous energy would have to be expended also. The digestibility of his food is of far more importance to him than its chemical composition. At one time different foods were designated as brain foods. Fish was said to be especially good, but now we know that any good, easily digested food is a good brain food. The man doing hard muscular work needs a larger quantity of all the food nutrients to maintain perfect health. He has excessive tissue waste, so his proteins must be considerably greater than the amount needed by a man at moderate work. He expends both muscular and nervous energy so freely that his fats and carbohydrates must be increased.

II. Children require more food in proportion to their body weight than adults. Metabolism is more active and growth requires a greater amount of food for tissue storage. An infant doubles its weight in 180 days. A child three or four years of age consumes nearly one-fourth as much food as in adult life. A growing child of ten to sixteen years of age requires and utilizes as much food as many adults, especially those past middle life.

The following table gives standards adopted by the United States Department of Agriculture (Thompson's *Practical Dietetics*):

Boy	14 to 16	years	of	age	needs	.8	as	much	food	as	a	man.
Girl	14 " 16	"	"	"	"	.7	"	"	"	"	"	"
Child	10 " 13	"	"	"	"	.6	"	"	"	"	"	"
Child	6 " 9	"	"	"	"	.5	"	"	"	"	"	"
Child	2 " 5	"	"	"	"	.4	"	"	"	"	"	"
Child	under 2	"	"	"	"	.3	"	"	"	"	"	"

Sex affects the quantity of food rather than the quality of food needed. As women usually weigh less and exercise less than men, they do not require as much food. Of course there are exceptions to this, but the majority of women do not need more than eight-tenths the amount of food of the adult man.

The minimum food requirements for different ages and sex are given by Thompson as:

Infant up to 1½ year...	Gm.	Protein	20-36,	Fat	30-45,	Carbo.	60- 70
Child 6-15 years of age.	"	"	70-80,	"	37-50,	"	250-400
Man at moderate work.	"	"	118,	"	56,	"	400
Woman at " "	"	"	92,	"	44,	"	400
Aged man	"	"	100,	"	68,	"	450
Aged woman	"	"	80,	"	50,	"	260

In age, even in health, the digestive and absorptive powers are less vigorous than in youth; circulation is more sluggish and secretions are diminished. Therefore the quantity of the food ingested must be diminished in order that the individual may derive the most benefit from it. Foods with little residue and less animal foods are better for people in old age.

III. The size and shape of the body influence the food requirement of the body more than the weight. Many very large people will gain weight on a very low diet, while many thin people will lose weight on the same diet. A tall thin person needs more food than a short fat person of the same weight. He has a greater skin surface and consequently his heat evaporation is greater.

IV. Climate affects the food requirement more as to the kind than as to the quantity of food to be consumed. As a rule more fat is used in a cold climate than in a warm one. This is probably due to the fact that it is more easily obtained than other foods. Dr. Cooke, physician to one of the Peary expeditions to the North Pole, in speaking of the food needed by the members of the party said that at no time did the men prefer or crave fats. The carbohydrate foods were the most valuable to them. People in warm climates are often vegetarians because meat is difficult to obtain. A need of the individual depends upon his occupation, to a large extent, in either a hot or cold climate. A mixed diet is best for all normal people. Individual experience must guide well people as to their choice of food in different seasons. For most people, it is better to change clothing rather than diet with seasons. Many people reduce the food value of their diet considerably in warm weather, but Ranke found by a series of experiments that his bodily weight fell and his general health suffered as a result of such changes in his diet. Upon this subject there are so many different opinions that it is impossible to give any hard and fast rules. Some of us perfer to decrease our protein and fat allowance in the summer and increase our carbohydrate by a generous addition of vegetables and fruits. As every man is a law unto himself, there should be no dogmatism in the matters of diet.

V. The health of an individual is one of the most important factors in governing his food requirements. All the standards given in this chapter are for the normal individual, the man with health. For the person that is ill, the quantity and quality of the food which he requires depends entirely upon the nature of his illness. In some cases much more than the normal quantity of food is required, as in tuberculosis or in other wasting diseases. In some cases where the individual is feeble or inactive much less food can be taken than is normally required. Diet in disease of various kinds will be discussed in detail subsequently in this book.

Study Helps

Why does a man doing hard physical labor require more food than one doing moderate work?

Why does a man need less food when resting than when at work?

Give approximate amounts of each food nutrient needed by a man doing moderate work.

What per cent of this is needed by a woman?

Would you change the quantity or the quality of food to be given to people doing different kinds of work?

Why do children require more food in proportion to their weight than grown people?

Why do very old people require less food than young people?

How would you change your dietary with the seasons or would you change?

CHAPTER III

NITROGENOUS FOODS

Outline.—

- **I. Animal Proteins.**
    - **(a) Meat.**
    - **(b) Gelatin.**
    - **(c) Fish.**
    - **(d) Eggs.**
    - **(e) Milk.**
- **II. Vegetable Proteins.**
    - **(a) Legumes.**
    - **(b) Cereals.**
    - **(c) Nuts.**

Study Helps.

Nitrogenous foods are organic foods containing nitrogen. Nitrogenous foods, proteids, may be subdivided into proteins, albuminoids, gelatinoids, and extractives. Proteins are compounds of carbon, oxygen, hydrogen, nitrogen, sulphur and sometimes phosphorus. Proteins repair and build tissue and thus maintain the nitrogen equilibrium of the body. Albuminoids and gelatinoids will replace proteins to a certain extent and are tissue sparers, but not tissue builders. Extractives are unable to replace body loss of nitrogen and are mainly valuable because they stimulate the appetite.

Proteins are of both animal and vegetable origin. The principal animal proteins are meat, fish, eggs and milk. The most important vegetable proteins are found in the legumes (peas, beans, and lentils), in cereals (wheat, corn, oats, barley), in nuts (almonds). Animal foods are richer in proteins than vegetable foods and the protein in them is more easily digested. Some of the protein in the vegetable foods is lost because of the cellulose found in the food. Animal foods include meat, gelatin, fish, eggs and milk. They contain high nutritive value. They are digested with very little residue and have very agreeable flavors. They contain salts which are very valuable to the human body.

Meat

Meat is one of the most important foods that we have. From it we get most of our protein supply. Meat forms the flesh of the animal body. The principal kinds of meat used for food are beef, veal, pork, lamb, mutton, poultry and game, and the offal (liver, heart, kidneys, etc.) of animals. Venison, bear steak, goat-flesh and horse-flesh are also used for meat in some countries. In this country some of them are not easily obtained, and many people have an inherited prejudice against the others. All contain good food value.

Meat is composed of bundles of muscle fibres bound together by connective tissue and interspersed with fat. The length of the fibres varies in different cuts of meat. The muscle fibres contain water, protein, mineral matters and extractives.

The digestibility of meat depends upon:

1. Age of the animal when killed.
2. Time kept before cooking.
3. Sex of the animal.
4. Care taken of the animal during life.
5. Quantity of fat.
6. Method of cooking.

As a rule the flesh of a young animal is more tender than that of an old animal, but this is not true of very young animals. Most meat is tough immediately after killing, so it is allowed to stand and "ripen." This process develops lactic acid which softens the connective tissue and improves the flavor of the meat. The meat of male animals, with the exception of pigs, is said to have more flavor than that of females. Animals which have not received good care or food furnish very inferior food. Meat which contains a large amount of fat is not so readily or easily digested as a leaner piece. Fried meats are the most difficult to digest. Broiling, boiling, stewing and roasting are the best methods of cooking meats.

Beef is the most valuable flesh food that we have. It may be eaten continuously for a longer period than any other meat. The best beef is obtained from a steer two to four years of age. The meat should be firm, fine grained in texture, well mottled with fat, and bright red when first cut. About 75% of meat is water. Beef is eaten both raw and cooked. Some authorities say that fresh, well chopped beef is more easily digested than cooked meat, but others disagree with this statement. Taken in either way beef is almost completely absorbed.

Many meat preparations, both solid and fluid, have been produced and a few years ago these were more generally used than at the present time. These contain none of the solids, or very little at least, of the meat. Some of these preparations are fluid, others have been made by the evaporation of the water. In some there is a considerable amount of alcohol. The amount of nourishment in most of them is very small and consequently they would not support life very long, even if the patient did not tire of them so readily.

Beef juice, extracted from fresh meat is an important food. From one pound of the round steak four to six ounces of beef juice may be obtained. It is very useful in many diseases and far ahead of any prepared tea or extract. Broth made from beef is valuable as a stimulant to the appetite and to the flow of the gastric juice; its food value is low. It is valuable when a light diet is desired.

Veal is not so easily digested as beef. Usually the animal is killed too young and the meat is tough and low in nutritive value. People who have weak digestive ability should avoid it entirely. It has no place in the invalid dietary.

Lamb is next to beef in digestibility when it is killed at the right age, providing it does not contain too much fat. As it is usually much more expensive than beef, from the economical as well as the palatable standpoint, it is not so generally used. Mutton contains more fat than beef and is not so digestible. Mutton broth is very good for invalids.

Pork is the most indigestible of all meats because it contains such a large percentage of fat. Bacon and ham are cured meats and are exceptions to the general rule concerning pork. Bacon and ham are readily digested and absorbed by the sick, if properly cooked. Ham should never be fried, it should be boiled, baked or broiled.

Chicken, squab, and turkey are well digested if properly cooked. The white meat is considered easier to digest because it contains less fat. Duck and goose contain too much fat to be valuable for use in the invalid dietary. Game is rich in extractives, but if properly cooked, young birds are easily digested. Many people do not care for game because it is so strongly flavored and a person tires of it very readily for this reason.

Sweetbreads, liver, heart, kidneys and brains of some animals are used for foods. The sweetbread is the pancreas or thymus gland of the calf. It is very valuable food for the sick as it is so easily digested. Liver is very commonly eaten and is quite nutritious. It should never be fried for invalids. The heart is apt to be tough and stringy and is not used for those who are ill. Kidneys if properly cooked and not too highly seasoned are easily digested. Brains are very low in nutritive value and are too high in fat for invalids.

The following table taken from Atwater and Langworthy's tables shows the nutritive value of various meats:

	% WATER	% PROTEIN	% FAT	CAL. PER LB.
Beef Ribs	43.8	13.9	21.2	1,135
Porterhouse Steak ...	52.4	19.1	16.1	975
Mutton	51.2	15.1	14.7	890
Lamb	42.	13.5	28.3	1,415
Bacon	17.4	9.1	62.2	2,715
Chicken	47.1	13.7	12.3	765
Squab	58.	18.6	22.1	1,430
Duck	51.7	14.3	33.4	1,805
Pork Chops	41.8	13.4	24.2	1,245

Gelatin

The purest form of gelatin is derived from the swimming bladder of the sturgeon. The collagen of the tendons and the ossein of bones of animals whose flesh is used for food will also produce gelatin when boiled.

Gelatin will not build tissue, but it will furnish material to the body for its use so that the body tissue may be spared. It is very valuable in fevers where tissue waste is very great. It is very insipid and of little value unless used with other foods.

Fish

Fish vary in nutritive value and in digestibility very widely. They are divided into two groups, fat and lean. Fat fish are not so readily digested as lean. Fish which contain five per cent or more of fat are salmon, eel, butterfish, mackeral, trout and herring. Codfish, sole, whitefish, bass, flounder and perch contain less than one per cent of fat. Although these do not have the flavor of the fatter fish, they are much more easily digested and so are more suitable as food for invalids. Some people can not use fish of any kind as they are unable to digest it. For invalids only fresh fish should be used, but dried, smoked, canned and other preserved fish are eaten and relished by many people. Fish is apt to prove a monotonous diet if used continuously.

Oysters when eaten raw are more digestible than any other animal food. When properly cooked they are excellent for the sick. Their nutritive value is greatly increased by using them with milk. The source of supply is very important. Deep sea oysters can always be eaten raw with safety, but disease, especially typhoid fever, has been contracted from eating oysters that have been grown in or been watered by contaminated water. Lobsters, crabs and shrimps may be eaten by some people in health, but they can not be used in invalid dietary, as they are very hard to digest. Canned meats or fish should never be allowed to stand in the tin after the can has been opened. They should not be allowed to stand in warm places as they decompose readily and thus produce ptomaine poisoning.

When Meat or Fish May Be Dangerous Foods

Cows and hogs are often infected with disease which may become epidemic, tuberculosis and cholera. The meat of such an animal should never be used for food. Canned meats when left in tin cans upon exposure to air may produce lead or ptomaine poisoning. Some tin cans contain as high as 12% lead. The solder used to seal the cans contains as much as 50%. Often times small pellets of this are dropped into the food. Canned fish of any kind decompose very readily upon exposure to the air and they should be used immediately upon being opened.

Sometimes animals may be parasitized. Pork may contain a worm, trichina, which will produce a very serious disease in human beings. We do not intend to eat any meat which is diseased, but as we can not always tell, our greatest safeguard is a thorough cooking in order to render the food sterile.

Eggs

Hen's eggs are the most generally used in this country, but the eggs of geese, ducks, guineas, and wild fowl are also widely eaten. In the United States nearly ten billion eggs are produced yearly. An egg is an undeveloped chick, so in it we find all the ingredients needed to support life and provide for the growth of the organism. In the average hen's egg, 12% is shell, 58% white, 30% yolk. The water content of an egg exclusive of the shell is about 75%. Eggs contain considerable mineral matter in organic compounds which are very easily absorbed. The most important of these minerals are iron and phosphorus. As seven and one half eggs will supply ten milligrams of iron, one can readily see the value of eggs for anemic people. No food except milk contains as much calcium; thus eggs are very valuable for young children also.

Eggs should be used to supplement foods rich in carbohydrate as they contain none themselves. They are moderately rich in both protein and fat. The digestibility of eggs depends upon their preparation and upon the physical condition of the person who uses them. Some people are unable to eat an egg, without nausea or flatulence. If properly prepared an egg is a very nutritious food for most people. It furnishes about sixty to seventy calories. Its food value is equivalent to that of one glass of milk or one and one-half ounces of fat meat.

Eggs should never be cooked at a temperature of more than 160° to 180° F. Higher temperatures harden the protein or egg albumen in the white of the egg and hinder the ease of digestion. An egg cooked at 160° F. is more quickly digested and absorbed than a raw egg, especially if cooked soft.

A raw egg is such a bland substance that it does not excite the flow of the gastric juice nor excite very vigorous peristalsis. Raw eggs are thus especially valuable when we wish to give the stomach less work to do; because they are passed on into the intestine largely unchanged. The absorption of eggs is very complete and very little residue is left in the intestine. For this reason, they prove quite constipating to some people.

There are very few artificial preparations of eggs. Dessicated or evaporated eggs can be re-dissolved and are valuable for army use or for any purpose when the fresh egg can not be obtained. Eggs may also be preserved in salt or in a liquid glass solution, so that they will keep for quite a while. They are also kept for long periods of time in cold storage, sometimes as long as ten months.

Milk

Milk is the only substance found in nature which is designed expressly for the use of the young animal. It is a perfect food for infants and a suitable one in part for many invalids and persons of sedentary habits. It is often called a perfect food because it contains all of the five food principles.

For an active adult it is not a desirable food for the sole diet. It is too high in water content and does not give any intestinal bulk or ballast. The approximate chemical composition of cow's milk is:

Water	87 -88 %
Protein	3 - 3½%
Mineral Matter	.7%
Carbohydrate	4 - 5 %
Fat	3½- 4½%

Cow's milk is more generally used than that of any other animal, especially in this country. In some countries goat's milk is used quite extensively, and the milk of a few other animals to a much less extent. The proteins in milk are casein and lactalbumen. Casein is the more important. It is combined with phosphate of lime and this helps to give the milk its opalescent color.

The carbohydrate in milk is lactose or milk sugar. It is one of the very few animal carbohydrates; most carbohydrates belong to the vegetable world. Lactose lacks sweetness and so is not readily fermented. Lactic acid is formed in milk by a normal process in which certain microorganisms act upon the lactose causing milk to sour. Sour milk must not be confused with spoiled milk. Sour milk is a good food, while spoiled milk is milk in which the protein has been acted upon by putrefactive bacteria and is unfit for use in any way.

The fat of milk is found in the form of an emulsion. The globules are very small. In a drop not larger than a pinhead, may be found 1,500,000 globules. This makes the fat of milk very easily digested. When milk stands the fat rises to the surface as cream. This is removed by skimming and butter is made from the cream or it is used for food unchanged. The cream may be separated from the milk by centrifugal force also. In this case it is not necessary to allow it to stand. The fat in the milk of different animals varies, especially with the climate. The milk of the whale may contain as high as 43% fat, because it lives in a cold climate and the young animal needs more fat for heat production.

The mineral matter in milk (iron excepted) is found in the same proportion as in the body of the young animal for whose use it is intended. The chief tissues to be built are bone and muscle, so we find phosphates of lime and potash. There is as much citric acid in the milk obtained from one good cow in one day as is found in two or three lemons. It is found in combination with lime.

Milk is poor in iron. The young animal upon birth has a large store of this obtained from the parent, so it is not needed in the milk.

Milk is a solid food. As soon as it enters the stomach it is coagulated by the rennin in the gastric juice. Therefore, milk should be sipped so that small curds may be formed and thus it will be more easily digested. For adults it is very valuable combined with other foods as well as used as a beverage. The protein, casein, is the best absorbed of all proteins. Its alkaline salts and its protein enable it to neutralize a considerable quantity of acid in the stomach. This makes it a very good food in some diseases of the stomach. For infants, it is often necessary to alter cow's milk as it differs from mother's milk considerably. It is usually diluted with sterile water or cereal water and sugar of some kind is added to make it more like mother's milk. There are several methods of adapting milk which will be given in a later chapter, in which infant feeding is discussed.

Under certain conditions milk may be contaminated and thus made unfit for food. Milk will spoil quickly at 60° F. or over this temperature. It keeps best at a temperature not over 54° F. It is impossible to make spoiled milk fit for food, but we have several methods for the preservation of good milk which are very valuable. Milk is dangerous when a number of days old, when it is handled by unclean or diseased people, when it is obtained from a diseased or ill-kept animal, when utensils in which it is put or kept are unsanitary, and when the surroundings of the animal are unsanitary. A polluted water supply may be used in rinsing pails or bottles and disease may be transmitted in this way. Typhoid fever, tuberculosis, diphtheria, scarlet fever, and septic sore throat have all been traced in many cases to milk as the direct carrier, with a polluted water supply as the indirect source in some cases. Bad milk can not be made good, no matter what is done with it, but preventive measures will keep milk from ever becoming bad. Organisms commonly found in milk are lactic acid bacteria, which are normal; gas producers and lactic acid producers which are undesirable; putrefactive bacteria, which must not be given opportunity to act.

Milk has been classified according to cleanliness as:

I. Certified milk. This is obtained from tuberculin-tested cows and must not contain over 8,000 bacteria to each cubic centimeter. (Ordinary milk will contain about 50,000.) No pathogenic bacteria, of course, are to be found in this milk. This is the safest milk for infant feeding which we can obtain, but unfortunately on account of the extra expense required for production, it is beyond the means of the largest class of people.

II. Inspected milk is also from tuberculin-tested cattle. It is under the supervision of an inspector, as is the certified. The sanitary conditions of both animal and its surroundings are carefully watched, and the handler must also be subject to strict supervision. In some states this milk is included in the certified milk.

III. Pasteurized and sterilized milk. Most large dairies, in our large cities especially, do not furnish anything but pasteurized milk. The milk is heated in a water-bath to 140° to 160° F. for 20 to 45 minutes and then cooled rapidly. This renders the milk more sterile especially if used within twenty-four hours. It also improves its keeping qualities and this is quite important as milk must often be transported from outside dairies or farms. Pasteurization does not alter the taste of milk. It will not make bad milk good as nothing can do that. It will not destroy poisonous products produced in milk by harmful bacteria. Sterilization of milk is an emergency measure and is usually needed only when the source of milk supply is suspected. By this process, the milk is heated in the water bath, to 212° F. for ten minutes or more. This will destroy most living bacteria. However, the taste of the milk is altered and some of the mineral salts and proteins are lost by this process.

IV. Milk suitable only for cooking. This is not dirty milk or milk containing any bacteria. If it is used in cooking it does not need pasteurization or sterilization first as it will be subjected to high heat in whatever preparation it is used.

All milk must be kept cool so that the putrefactive bacteria will not have an opportunity to work upon the protein. Babies are extremely sensitive to impure milk. A large per cent of infant mortality in the past has been due to poor milk or milk improperly preserved. Milk to be used as a food for babies should be from tested cattle and should always be pasteurized.

The principal milk products are cream, butter, buttermilk and cheese. Cream as we have already said, is the fat of the milk. Butter is obtained from the cream by churning and buttermilk is the by-product. Cheese is made from milk and is rich in both protein and fat. Koumiss is a fermented milk used sometimes when milk can not be retained. Whey is obtained from milk after the fat and protein have been removed.

Vegetable Proteins

The principal vegetable proteins are found in the legumes and grains. The legumes are peas, beans, and lentils. They are also called pulses. They are the only plants which use the nitrogen of the air for food. The proteid substance found in them, legumin, is often called "vegetable casein," because it resembles the protein in milk. Although the percentage of protein in legumes is greater than in meat, it is not nearly so completely absorbed. Vegetable proteins are poorer in carbon but richer in nitrogen than meat. They contain considerable sulphur and are liable to produce intestinal flatulence and so are very harmful to some people. As the legumes contain large amounts of protein and carbohydrate, they are made more palatable and more digestible by cooking with some food rich in fat.

Cereals contain ten to fourteen per cent of protein. The most important cereal protein is found in wheat. It is called "gluten." Gluten is capable of considerable expansion. In making bread yeast is used. This acts upon the sugar and produces a fermentation and carbon dioxide and alcohol are formed. The carbon dioxide acts upon the gluten causing it to expand and makes the bread light. Baking the dough drives off the carbon dioxide and the alcohol. Corn, oats, and rice also contain some protein but it is not so elastic as the gluten in wheat.

The meat of nuts is also rich in protein. A pound of unshelled nuts furnished nearly one-half as much protein as one pound of flour. As nuts are also rich in fats, they have a very high food value. Persons in health may use nuts to afford variety in diet. They contain too high a percentage of fat to form a well balanced food unless eaten with other foods. They may be used to good advantage with foods of high carbohydrate content.

Some people believe that vegetable proteins will entirely take the place of animal proteins in the dietary. Others do not agree with this as it is necessary to consume a very bulky diet in order to get the amount of protein required by the normal individual. This is liable to cause a distension of stomach and bowels. A larger amount of blood is required for the extra work thrown upon the digestive system and much more nervous energy must be expended. Some authorities claim that the power of the vegetarian to resist disease is much less than that of other individuals.

Study Helps

What is legumin? Where is it found?
What is gluten? Where is it found?
What foods contain vegetable protein?
What are the uses of protein in the body?
What food principle is lacking in eggs?
Why is milk sometimes called a perfect food?
Name some foods rich in protein.
Name some foods poor in protein.
What is gelatin?
What is casein? Where is it found?
Why are eggs harmful to some people?
What is the composition of protein?
What is the correct temperature for cooking eggs? Why?
Give one objection for a strictly vegetable diet for a normal individual.
What is a protein sparer?
Distinguish between pasteurization and sterilization of milk.
Give a list of easily digested meats.
How may milk be predigested?

What is the composition of an egg?

Name some differences between cow's milk and mother's milk.

Mention some essential points to be considered in the proper care of milk.

Why does milk sour?

Why is pork so difficult of digestion?

Why is cream so easily digested?

Name some important milk products.

What causes bread to rise or become light?

Why are milk and eggs good for rachitic children?

How may ptomaine poisoning be avoided?

Which is higher in food value, beef broth or beef tea?

CHAPTER IV

NON-NITROGENOUS FOODS

Outline.—

- Carbohydrates.
    - (a) Composition.
    - (b) Source.
    - (c) Classification.
        - 1. Sugars.
        - 2. Starches.
        - 3. Cellulose.
        - 4. Pectose.
    - (d) Table of Carbohydrate Foods.
- Study Helps.

Carbohydrates

Carbohydrates are food substances which contain carbon, hydrogen, and oxygen. There is usually twice as much hydrogen as oxygen in carbohydrates. This is in the same proportion that they are found in water; hydrogen two parts, oxygen one part in every molecule of water. However, in carbohydrates, hydrogen may form twelve or twenty-two parts to six parts or eleven parts of oxygen respectively. Carbohydrates contain no nitrogen available for body use. Although there may be a very small amount of nitrogenous material in cell walls, it is lost in elimination. When carbohydrates are burned, carbon dioxide and water are produced. Carbohydrates are found mainly in the vegetable kingdom, and we commonly think of them as starches and sugars. We have two important carbohydrates from the animal kingdom; lactose or milk sugar found in milk, and glycogen or animal starch found in liver.

Carbohydrates may be divided into three general classes, monosaccharids, disaccharids and polysaccharids. They are all either simple sugars or substances which can be subdivided or broken into simple sugars by hydrolysis. This is accomplished in the body by the different enzymes found in the digestive juices. The most important monosaccharids are grape sugars and fruit sugars. Beet, cane, maple, malt and milk sugar are disaccharids. Starch and cellulose are polysaccharids.

Carbohydrates are heat and energy producing foods. They do not build tissue, but by furnishing material for heat production they spare tissue waste. Carbohydrates may be found to some extent in liver and muscular tissue. The excess over body needs is stored in this way for future needs.

Sugars may be subdivided into two classes, sucroses and glucoses. Cane, malt, beet and milk sugar are sucroses. Grape and fruit sugars and honey are glucoses. Glucose is sugar in its simplest form and thus it is very quickly absorbed and assimilated and quickly available for body use.

Sugar is very necessary in the diet of a normal child. It furnishes material for heat and energy, and spares tissue waste in active, growing children. In any normal diet, sugar used in proper combinations with other foods is very valuable. Sugar also has the power to relieve fatigue. Experiments with soldiers have proved that they were able to endure hunger, thirst, cold and fatigue more readily when given a plentiful ration of sugar.

Cane sugar is made from the juice of the sugar cane, a plant grown extensively in some of our own southern states. Cuba, Jamaica and South America also raise cane for sugar production. The variation in different grades of sugar is due to the refining process through which the syrup is taken. Cane sugar taken in large quantities blunts the appetite for other foods and is irritating to the stomach as it ferments very readily. Used in moderate amounts it is a very good food. Some people can take very little, but four ounces daily should be a maximum for anyone. For people who can not assimilate sugar, saccharin is used as a substitute. This is a coal tar product with about 300 times the sweetness of sugar. Saccharin must be used very carefully and in very small quantities or it will make foods bitter.

Beet sugar has chemically the same analysis as cane. It is obtained from large sugar beets. At one time a very large percentage of this was obtained from foreign countries, principally from Germany. Today our own country furnishes a large output of beet sugar yearly. Some of our western states raise beets very extensively for sugar manufacture.

Maple sugar is obtained from the hard maple tree. In the spring of the year the tree is "tapped" and the sap obtained in this way is boiled down and the sugar crystallizes out. Chemically it is the same as cane and beet sugar. Maple sugar is used mainly for table syrups and for flavoring purposes.

Malt sugar is a cereal sugar obtained from malt barley. It is used in combination with other sugars. For instance, when we wish to increase the carbohydrate in an infant's feeding we add dextrin-maltose.

Grape sugar is a crystalline sugar found in grapes. Other fruit sugars known as levulose, are found in ripe fruits, more abundantly in sweet fruits than in sour ones. Fruits are valuable in the diet not only because of the carbohydrates which they contain, but because of the organic acids found in them. These acids gently stimulate peristalsis and we say that the foods are laxative. Figs, prunes, dates, apples and oranges are valuable fruits for this reason.

Honey is the product of bees. It varies in flavor according to the food the bee takes. Honey which is produced by bees that are able to obtain the nectar from flowers is considered best by most people.

Milk sugar is the sugar found in milk. It is called lactose It does not have the characteristic sweetness of other sugars and does not ferment readily. It is very easily assimilated and thus is a valuable source of energy in some wasting diseases.

Starches

Starches form a large proportion of the diet of a normal individual. Dietaries mentioned in a previous chapter show that the normal individual takes two or three times as much carbohydrate in his diet as the combined amounts of proteins and fats. As not more than one third of this is supplied by sugars, the remainder must be composed of starch. Starch is found principally in the seeds, roots and tubers of plants. Because of the protecting cellulose walls, it is insoluble in cold water. Heat causes both chemical and physical changes and breaks down the cellulose walls so that the starch becomes soluble in water. The main commercial sources of starch are wheat, corn, potatoes and rice. All cereals contain a large amount of starch. This constitutes the chief nutritive value.

Wheat is the most important cereal food that we have. The wheat grain itself without any change may be used as food. It is more commonly used, however, after it has been made into flours or breakfast cereals. Bread made from flour has always been a staple article of diet in this country. It is one of our most nutritious foods. Oats, rye, barley, corn and rice are also very important carbohydrate foods. Corn and rye are used quite extensively in bread-making either combined with wheat or alone, and they form very nutritious foods.

Starches are used in combination with other foods, as they would not be very palatable alone. Cornstarch combined with milk and eggs and sugar makes a very nutritious pudding. Starchy foods should be cooked at high heat for a long time in order to prepare them thoroughly. This changes the starch to dextrin and soluble carbohydrates and these are much more readily acted upon by the digestive ferments. Very little starch is lost in absorption if it is properly cooked. In toasting bread we subject it to a very high heat. This dextrines part of the starch. If browned very deeply, part of it is caramelized.

Cellulose

Cellulose is carbohydrate which is not soluble in either hot or cold water. It forms the framework of plants and the cell wall which enclose the starch grains. It can only be affected by acids. As cellulose ages it becomes woody and even acids have little effect upon it. Ordinarily cellulose furnishes very little nutritive value to the body, but it is valuable as a mechanical irritant and encourages peristaltic action. It is also valuable in the large intestines in keeping the feces soft and supplies bulk or ballast which helps to retain the food so that it is more completely absorbed. With the action of bacteria present in the intestine, it forms acids which tend to check intestinal putrefaction. Most green vegetables contain considerable cellulose. Their nutritive value is low. They are, however, a valuable source of mineral salts. The salts which they contain are valuable in helping to maintain the alkalinity of the blood and to lower the acidity of the urine. Some fruits are also valuable for this reason.

Pectose

In addition to starches and sugars, we have a substance in some fruits and vegetables which gives them the power of forming jelly when boiled. These substances are called pectin bodies or pectose. Their nutritive value is the same as that of other carbohydrates. In green fruits these substances are combined with organic acids and are insoluble. Ripening of the fruit changes their form so that part of them can be acted upon by the digestive juices and may be assimilated by the body. They can not be said to be easily assimilated, however, and if fruits containing them are eaten in excess they are apt to appear in the urine.

SOME FOODS RICH IN CARBOHYDRATES

FOOD	% CARBOHYDRATE	FOOD	% CARBOHYDRATE
Rice	79	Dried dates or figs	70
Sugar	100	Wheat flour	75
Honey	81	Tapioca	88
Barley flour	73	Cornmeal	75
Oatmeal	68	Farina	76
Cane molasses	69	Macaroni	74
Cornstarch	100	Arrowroot	98
Dried navy beans	60	Sago	78
Green corn	20	Dried lima beans	66
Grapes	19	Bananas	22
Peanuts (edible portion)	20	Oranges	12
Prunes	70	Chestnuts, dried (edible portion)	71

Study Helps

Why is cellulose valuable?
What is the food value of one gram of carbohydrate?
What is lactose? Where found?
What is a protein sparer?
Give one objection to a strict vegetable diet?
What is saccharin?
Name three fruits valuable for their laxative effect.
What is a mixed diet? Why is it advisable?
What is a concentrated food? Name two.
What are carbohydrates? Of what elements are they composed?
Why is starch insoluble in cold water?
Of what value is sugar as a food?
At what age is a healthy child usually able to digest starch?
In what ways are organic acids valuable?
What changes take place when wheat flour is made into bread?
Name some foods that can be called "starchy" foods?
Name three important kinds of sugars.

CHAPTER V

NON-NITROGENOUS FOODS

Outline.—

- **Fats and Oils**
    - **(a) Composition.**
    - **(b) Varieties.**
        - **Animal Fats.**
        - **Vegetable Fats.**
        - **Uses of Fat in the Diet.**
        - **Valuable Fat Foods.**
- **Study Helps.**

Fats and Oils

Fats and oils contain the same elements that are found in carbohydrates, but in different proportions. In starches about forty-four per cent is carbon, while fats contain seventy-five per cent. Thus when fats are burned a greater amount of heat is produced than when an equal quantity of carbohydrate is burned. Fat is the most concentrated food nutrient that we have. Fats and oils are obtained from both vegetable and animal kingdoms. In the living body all fats are liquid, in dead bodies they solidify; as lard, tallow and suet. Twenty per cent of the human body is fat. The three most important fats found in food materials are olein, stearin and palmitin. Olein is a liquid fat; stearin and palmitin are hard fats with high melting point. Olein is the chief constituent of olive oil, stearin of mutton fat and suet and palmitin of palm oil. All fats can be separated into fatty acids and glycerol. They are soluble in ether, benzine and chloroform.

Most people do not use more than one hundred grams of fat daily, although more can be utilized to advantage by many people. In tuberculosis and diabetes sometimes twice this amount of fat is well borne. In some cases an excessive amount of fat will produce nausea and diarrhea. The Esquimaux take most of their heat and energy producing food in the form of fat. In the first place, carbohydrates are not so easy as fats to obtain in the Frigid Zone; in the second place much more heat producing food is needed in so cold a climate, and it can be obtained in a much more compact and concentrated form by the use of fats. As a rule the food of the rich is more plentifully supplied with fats than that of the poor man, because fat is much more expensive than carbohydrate foods. Oftentimes fats are not easily utilized in cases of indigestion and in acute illnesses; then their use is contraindicated.

Animal Fats

Cream and butter are our most important animal fats. Both are milk products. Although cream contains about the same amount of protein and carbohydrate as milk, it is much richer in fat. Milk has a higher proportion of water than cream. The fat content of cream varies. It is dependent upon the method by which it is obtained. Thin cream contains about 15% fat, while heavy cream contains about 40%. Cream is a very easily digested fuel food. The fat is in the form of a fine emulsion, so that it is very readily acted upon by the digestive juices.

Butter is obtained from cream by churning. This causes the fat globules to form a solid mass. Butter is rich in fatty acids which are soluble in water. Butter gets its name from the most important one of these, "butyrin." The fat of butter is mainly olein, the soft or liquid form of fat. As most of the fat of the human body is olein, it is easy for us to account for the ease with which butter is absorbed. It is the most easily digested of all animal fats. When certain bacteria act upon the protein in butter, it becomes rancid and is spoiled for food. Many very valuable substitutes for butter are on the market. They are good foods and contain high nutritive value in a much cheaper form than butter. They are not adulterations unless falsely labeled. There is very little difference in their utilization by the body in comparison with butter. Usually they are a mixture of vegetable and animal fats, but sometimes they are pure vegetable fats. Cotton seed oil and cocoanut oil are used extensively in this way.

Cheese is made from milk and usually has about one third each of water, fat, and protein. The method of its preparation controls the percentage of fat which it contains. The flavor of cheese is due to the milk used, the ferment and the bacteria which "ripen" it. Cheese is a very concentrated food. It is most easily digested when used in combination with other foods. Some people have considerable difficulty in digesting it, but its absorption is very complete after it reaches the intestines.

The amount and kind of fat in the meat of different animals varies greatly. In the breast of chicken we find almost no fat; in pork and goose there are large quantities. Meat that contains a large amount of fat is not as a rule so easily digested as a leaner meat. Bacon is an exception to this, however. Its fat is in a granular form and is easily digested even by children and invalids.

Lard is the substance prepared from the fat of pork. It is used for cooking purposes. It is also used in combination with some vegetable fats to form butter and lard substitutes which are much cheaper than either of those products. Tallow is the fat obtained from mutton and beef. It is used for cooking and for the manufacture of candles and some other articles.

The yolk of the egg is rich in fat present in the form of an easily digested emulsion. It is also very completely absorbed. Lecithin is a substance found in egg yolk. It is chemically different from fats, but is usually classed with them as a "nitrogenous" fat.

Vegetable Fats

The fats in vegetable foods are found mainly in the seeds of the plant. Chemically, they are the same as the animal fats. They contain more olein and so are liquid fats. This makes them more easily digested than animal fats. Olive oil and cocoa butter are among the most valuable of vegetable fats. Olive oil is slightly laxative and assists in the mechanical digestion of foods. Nearly all nuts are rich in fats. The edible portion of some of them contains as much as 70% of fat. Cocoa butter is made from the cocoanut. It is used extensively for cooking purposes. Almonds, pecans, peanuts, walnuts, hickory nuts and butternuts contain a large percentage of fat. Peanut butter and products made from it are very popular. However, as a rule, nuts are not well digested.

Chocolate and cocoa are valuable fatty foods made from the cocoa bean. Chocolate is prepared from the nibs without the removal of much of the fat and contains about 50% fat. In the manufacture of cocoa a larger part of the fat is removed. It contains 20 to 30% of fat. Both are used in combination with other foods to form nutritious beverages.

The volatile oils are useful for flavoring extracts. They have little in common with true oils. They stain paper only temporarily, while true oils stain permanently. Vanilla and oil of lemon are examples of these. Many flavorings are now manufactured from chemicals instead of from the vegetable foods. Banana flavor can be made from stale butter, caustic soda and chloroform.

Dr. Gilman Thompson gives the following functions of fat in the diet:

1. To furnish energy for heat development.
2. To supply force.
3. To serve as a covering and protection in the body.
4. To make various structures of the body more plastic and give rotundity to form.
5. To spare tissue from disintegration.
6. To serve as a storage of energy.

TABLE OF SOME VALUABLE FAT FOODS

FOOD	APPROXIMATE % FAT	FOOD	APPROXIMATE % FAT
Olive oil	100	Cocoa	30
Bacon	60	Oleomargarine	100
Butter	85	Olives (edible portion)	25
Lard	94-100	Almonds (edible portion)	55
Tallow	100	Pecans (edible portion)	71
Cottolene	100	English walnuts (edible portion)	63
American Cheese	35		
Cream	20-40	Roast beef (average cut)	28
Chocolate	50		

Study Helps

Why is more fat required in cold than in warm climates?
Name three important vegetable foods rich in fat.
What is lecithin?
Name three fatty acids found in foods.
What do you understand "adulteration" to mean?
Into what two constituents may all fats be separated?
In what condition is fat a particularly valuable article of diet?
What is the most easily digested animal fat?
From what does butter obtain its name?
Name one meat poor in fat and one rich in fat.
Why is bacon easily digested?
Give three uses of fat in the diet.
What is the difference between cocoa and chocolate?
Why is olive oil a valuable food?

CHAPTER VI

WATER

Outline.—

- Water.
    - Composition.
    - Source.
    - Varieties.
    - Impurities.
    - Uses.
    - Beverages—(Largely Water).
        - (a) Acid Drinks.
        - (b) Farinaceous Fluids.
        - (c) Coffee.
        - (d) Tea.
        - (e) Cocoa and Chocolate.
        - (f) Alcoholic Beverages.
- Water Content of Foods.
- Study Helps.

Water

Water is essential to both animal and plant life. Without it neither would be able to utilize food needed for growth. Water is composed of hydrogen and oxygen; every drop contains twice as much hydrogen as oxygen. It forms almost seventy per cent of the human body. Elasticity of tendons and muscles would be impossible without it. Pure water is colorless, odorless and tasteless, but pure water is rarely found in nature. Impure water does not necessarily mean that water is contaminated or polluted so that it is unfit for use. Some impure water gathers minerals from the ground through which it flows, which change its taste but may not alter its value in any way. Water is a solvent and readily dissolves mineral and organic substances with which it comes in contact. Water freezes at 32° F. and boils at 212° F. It can not become hotter or colder than this except under pressure.

Both vegetable and animal foods contain large amounts of water. Some green vegetables contain as much as 90%, and some meats 50%. Fat meat does not contain as much water as lean as the fat displaces the water. Milk contains about 87% water.

Water bathes the tissues and washes away the waste of the body. It mechanically excites peristaltic action and increases intestinal secretions, thus aiding in elimination. It is very valuable in cases of chronic constipation especially if taken when the stomach is empty.

Through the processes of elimination of waste material by the lungs, skin, kidneys and intestines, a large amount of water is constantly lost. This must be replaced by the fluid intake and by the water in solid foods. Many people do not drink enough fluids and the body in endeavoring to keep its fluid content constant withholds water from the kidneys and from the digestive glands. This causes constipation and sometimes urinary disturbances. The body needs 80-90 ounces daily, about 60-70 ounces of this is taken in fluid form and the rest in the food. Hot water is very quickly absorbed and in many cases is very beneficial to weak digestions. It relieves thirst very quickly. Lukewarm water is very useful as an emetic, if taken in large quantities.

Some of the most important kinds of water are hard and soft waters, rain water, spring water, mineral and carbonated waters. Hard water contains salts of magnesium or lime. Some of these contain the minerals in excessive amounts. These favor constipation and aid in forming calcareous deposits in the body. Soft water contains the salts in very small quantities and is a more wholesome drinking water.

Rain water as it falls is pure, but when it reaches a certain distance above the earth it meets dust particles and bacteria, so that by the time it reaches the earth it contains many foreign substances. Rain water which sinks into the ground and appears again as spring water after draining through gravel bed is usually very pure.

Mineral waters contain iron, sodium chloride and lime salts. For general use water should not contain more than one per cent of mineral salts. Strong alkali waters irritate the digestive tract; and if their use is continued for any length of time, they cause digestive disorders. Some of these waters may be purified by boiling, especially when carbonic acid holds the mineral substances in solution. By this method the carbonic acid is driven off and a deposit is precipitated from which the water may be drawn. Waters containing gypsum or calcium sulphate can not be purified in this way as boiling will not give a deposit. Water that has too much mineral matter can not be used to advantage for general use. It can only be rendered pure by distillation and this is not practical in most homes. Boiled water becomes flat unless aerated. This may be done by turning from one bottle to another. Carbonated waters are waters to which mineral salts, as salts of sodium, potassium, or lithium are added and the water is charged with carbonic acid gas under pressure. Most mineral waters on the market are artificial products. They should not be used to any extent unless under the direction of a physician.

There is considerable disagreement as to whether water should be taken with one's meals or not. Some authorities believe that it aids in the utilization of the food and favors metabolism when taken plentifully with meals; others discourage its use with meals. They believe that it dilutes the saliva and gastric juice and renders them less active. One thing we do know and that is that water should never be used to wash down the food. The saliva should soften the food so that by the time that it is properly masticated it will be readily swallowed. Food washed down by water is in no condition for the stomach to handle and thus its digestion is either rendered more difficult or part of the food is lost because of the inability of the stomach to handle it.

Water may be and often is a source of danger. Besides dissolving mineral matters with which it comes in contact, it often carries substances derived from decaying vegetable or animal matter. Too much care can not be paid to the source of our water supply. Surface wells located near barns or outhouses have been responsible for much sickness and death. Decayed animal or vegetable matter furnishes excellent breeding places for flies and harmful bacteria. When this material and the water come together, the water is impregnated with these harmful substances which act as poisons and irritants to human beings. Water may also be polluted by coming in contact with disease bacteria from excreta or from insects and in this way disease such as typhoid may be contracted. So we may say that water may be rendered impure by mineral salts in excessive amounts, by decaying vegetable or animal matter, or by disease bacteria. The last two contaminate or pollute the water as well as render it impure. Whenever the source of the water supply is suspected, the water should be boiled.

Water is especially useful to the body because:*

1. It enters into the chemical combination of the tissue. Thus we may say that water is a tissue builder.
2. It is the chief ingredient of all the fluids of the body and maintains their proper degree of dilution.
3. By keeping the various surfaces of the body moist, it prevents friction and uncomfortable symptoms which might result from dryness.
4. It furnishes in the blood and lymph a medium by which food may be taken to remote parts of the body and waste material removed.
5. It serves as a distributor of body heat.
6. It regulates body temperature by physical processes of absorption and evaporation.

Beverages

As beverages contain so large a percentage of water, they will be discussed in this chapter. Many of them are merely infusions of some product containing little or no food value. Dr. Gilman Thompson classifies all beverages as follows:

1. Those which are taken to relieve excessive thirst, as lemonade.
2. Diuretics, mineral and carbonated waters.
3. Diaphoretics, hot lemonade or hot tea.
4. Diluents of ingested food and of waste material of body alkaline and mineral waters.

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* Thompson: Practical Dietetics.

5. Stimulants of nerves and other organs; coffee, tea, and mild alcoholic beverages.

6. Intoxicants; beer, ales, strong wines and whiskies.

7. Demulcents, mucilaginous, farinaceous and gelatinous beverages; barley water, gelatin solutions, flaxseed tea.

8. Tonics to aid digestion; koumyss, malt extracts, alkaline waters.

9. Astringents; red wines, tea.

10. For nutrition; cocoa, chocolate, koumyss, malt extracts, fruit juice beverages, tea and coffee taken with sugar and cream.

Orangeade and lemonade are especially useful in the sick room. They furnish light nourishment and are cooling and refreshing. They are also mildly diuretic. The sugar used in them increases the food value. Alkaline and mineral waters are sometimes mildly laxative and have a mild tonic effect upon the mucous membrane of the stomach. They are diuretic on account of the salts they contain. However, if used to excess they may cause flatulence. Apollinaris aids weak digestion and is a diuretic. It is often very useful in allaying nausea and vomiting. It may be used with milk and cream and is valuable to aid in overcoming constipation. Barley, rice and oatmeal water are very valuable for many invalids with stomach and intestinal troubles. Barley water will allay nausea many times when nothing else seems to benefit the patient at all. Flaxseed tea is useful in some cases where a cough is persistent. Malted milks and various malt extract preparations are useful in fevers and in many digestive disturbances. Malted milk preparations are also very valuable for artificial feedings for some infants.

Coffee

Coffee is a beverage made from the seeds of the coffee tree. It is an evergreen tree native to the tropics. Its fruit resembles a small cherry with two seeds face to face. The coffee bean contains protein, fat, carbohydrate, mineral ash and water. Only a small part of the nutrients in the coffee bean are soluble or available for use. So small a quantity of coffee is needed to make the infusion that very little food value is finally obtained. The stimulating effects of coffee are due chiefly to the alkaloids, caffeine and theine which it contains. These act upon the nerves and kidneys. It also contains a volatile oil which gives it its characteristic flavor and odor. Coffee should be kept in a tight receptacle and ground when it is wanted for use, if possible, in order to avoid loss of flavor. When coffee is properly made all of the soluble ingredients are obtained and none of the aroma is lost. Continued boiling makes coffee bitter and dissipates the oil which gives it its flavor. It should never be given to children.

Coffee may have both good and bad effects according to its use or abuse. It acts upon the muscular, vascular, and nervous system, relieving fatigue and often strengthening the heart action; when used to excess it may cause extreme nervousness and palpitation of the heart. It is a very valuable antidote for opium or laudanum poisoning, as it keeps the senses alert and aids in keeping the person awake when sleep is absolutely to be avoided. It is also valuable in alcohol poisoning as it soothes and quiets the nerves. Coffee is mildly laxative and mildly stimulates gastric digestion.

Many cereal substitutes for coffee are on the market but none of them have the volatile oil or theine which make coffee such a popular beverage. Coffee is often adulterated; chicory, peanuts, acorns, date seeds, beans or peas are used for this purpose. Chicory is the most commonly used. It is harmless and richer in sugar than coffee. Its presence is very easily detected as it is much heavier than coffee. Pure coffee floats or sinks very slowly, chicory sinks very rapidly. Chicory belongs to the dandelion family, but only the root is used.

Tea

Tea is a product consisting of the leaves of an evergreen shrub grown extensively in Japan, China, India and Ceylon. The smaller and younger leaves and the pekoe or blossom make the best tea, but various grades are obtained from the different sized leaves. The leaves are gathered by hand and withered in the sun. Then they are rolled or twisted by hands or feet of natives or by machinery. Several pickings are obtained each year. We have two varieties of teas, green and black. Green tea is steamed and dried with high heat and the color is preserved. It contains more tannin than black and is therefore less wholesome. Tannin is a vegetable astringent containing no food value. In strong solutions it interferes seriously with gastric digestion and hinders peristaltic action of the intestines, thus aiding in producing constipation. Tannin is very soluble so tea should be made by allowing the water to stand on the leaves not more than three to five minutes. Green tea is easily adulterated by addition of indigo or Prussian blue to produce the desired coloring. Black tea is made by bruising the leaves and allowing them to ferment before they are dried. Both varieties of tea may be produced from the same plant. The flavor and odor of tea are due to the volatile oils which it contains. Sometimes orange blossoms, jessamine, or fragrant olive are added to improve the flavor. The flavor also depends upon the time of year in which the leaves are gathered, the variety of the plant, the age of the leaves, and the method of preparation. Theine is an alkaloid substance which gives tea its stimulating effect. It is combined with tannic acid to form a salt. There is no carbohydrate or fat in tea and the small amount of protein is not in a soluble form, so tea does not possess any nutritive value.

Tea is mildly stimulating to the nervous system, it is refreshing and sometimes relieves body fatigue. It has been found very valuable for soldiers worn out from marching or exposure. Ladies worn out by shopping and elderly people whose energies flag easily derive considerable benefit from a moderate use of tea. It relieves nervous headache and is also a mild cardiac stimulant. It is an antidote for opium poisoning, although coffee is much better. Tea should not be given to children, nervous adults, or to people with digestive disturbances. The better grades of tea are less harmful than the cheap ones. Used to excess tea hinders digestion, causes constipation, causes insomnia, and by over-stimulation depresses the nervous system. Tea is sometimes adulterated by the addition of catechu or iron salts to increase its astringency and by the addition of foreign substances to change its color.

Cocoa and Chocolate

Cocoa and chocolate are both preparations made from the seed of the cacao tree, which grows in South America and the West Indies. This tree blossoms frequently and yields two crops yearly. The fruit resembles a cucumber and contains two or three dozen seeds. These seeds are dried in the sun, sometimes they are allowed to ferment first. The fermented product has the better flavor. The seeds are ground between hot rollers and some of the fat is removed. The seeds do not contain any carbohydrate, but all other nutrients are found to some extent. Fat predominates. Starch or sugar are usually added to the rolled product to produce either cocoa or chocolate. Fully fifty per cent of the cocoa bean is fat. This has an agreeable flavor and does not become rancid. The proteid is not very soluble, so little of it is available for body needs. More fat is removed in the production of cocoa than in that of chocolate. Although chocolate thus contains more nutritive value, it is not so well borne by a weak stomach. Chocolate is a very concentrated food and considerable nourishment may be obtained in a very compact form. This makes it valuable for soldiers or travelers. It can also be used with other foods to form beverages or other nutritious articles of diet. Cocoa is usually prepared with additional starch, so it must be boiled in preparation. Then milk may be added and we have a very nutritious beverage. Cocoa and chocolate have the advantage over tea and coffee in that they are mildly stimulating and relieve fatigue without causing sleeplessness. Theobromine is the alkaloid principle in them which corresponds to theine and caffeine in tea and coffee.

Alcoholic Beverages

Alcohol is a substance produced by fermentation of starches and sugars. In the United States grains and fruits are the chief sources from which this product is derived. Its food value is much disputed and it is not needed by any person in health and by very few who are ill. In fact some physicians are disputing its therapeutic value in any case. Others contend that it is very useful in some acute infectious diseases. We must leave this entirely to the discretion of the physician in charge of the case. Some nations include some alcoholic beverage in the regular ration of their soldiers during time of war; in the United States its use has been discouraged except on occasions when the men have to be under conditions of great stress and exposure. Beer made from hops, barley and yeast contains only 3 to 4 per cent of alcohol. Whiskey is made from grains and is distilled. It contains about 50 per cent of alcohol. Brandy is distilled from potatoes, corn, grapes, apples, molasses and some other fruits and grains. It contains 45 to 60 per cent of alcohol. Wine is made from the juice of several varieties of grapes. The alcoholic content ranges from 6 to 25 per cent. Many substances are added to the fruit juices to produce the various flavors, acid and mineral salts, gelatin, fat, sugar, alcohol, and carbonic acid. Wines and liquors are also often adulterated by the addition of ginger, logwood, nuts, alum, cream of tartar, orange peel, nux vomica and many other substances.

TABLE SHOWING WATER CONTENT OF SOME COMMON FOODS

FOOD	% WATER	FOOD	% WATER
Asparagus	94	Apples	84
String beans	89	Bananas	75
Beets	87	Cherries	80
Cabbage	92	Grapes	77
Carrots	88	Lemons	89
Cauliflower	92	Oranges	89
Onions	80	Strawberries	90
Green corn (edible portion)	75	Milk	87
Lettuce	95	Lean beef	60-85
Potatoes	78	Fowls	64
Spinach	92	Fish	60-75
Tomatoes	94	Oysters	84
		White bread	30-40

Study Helps

Name five foods high in water content.
How may water be contaminated?
Name two mineral salts found in hard water.
How would you purify suspected water?
Name four important uses of water in the body.
Name three classes of beverages.
Give examples of each and give one dietetic value of each.
What is theine? Tannin?
What is the correct method of preparation of a cup of tea?
How may coffée be adulterated?
How much fluid does the body need daily?

CHAPTER VII

MINERAL SALTS

Outline.—

- **Required Amounts.**
- **Source.**
- **Principal Kinds.**
  - **(a) Sodium Chloride.**
  - **(b) Calcium.**
  - **(c) Phosphorus.**
  - **(d) Potassium.**
  - **(e) Iron.**
- **Uses.**

Study Helps.

The amount of mineral salts found in a well balanced diet will probably not exceed twenty grams, but it is nevertheless a very essential nutrient for both children and adults. Approximately five per cent of the weight of the human body is mineral salts, about five-sixths of this being found in the bones and teeth. The solidity is due to calcium and magnesium salt. Minute quantities of various mineral substances are indispensable to all living cells. Most of these substances are present in the food in organic combinations. They pass into the blood unchanged and are carried to the various parts of the body and each selects what it needs for its own special use. As there is no oxidation of these materials they have no fuel value. They are tissue builders, needed for the building and repairing of osseous, muscular and nervous tissue; they are also essential to body fluids.

Hutchinson gives the following table as the daily requirement of some of the essential mineral ingredients needed by the body:

Phosphoric acid	3	to 4	gm.
Sulphuric acid	2	to 3½	"
Potassium oxide	2	to 3	"
Sodium	4	to 6	"
Chlorine	6	to 8	"
Calcium oxide	.7	to .8	"
Magnesium oxide	.3	to .5	"
Iron	.006	to .012	"

Pulses and cereals are richest in salts, vegetables next, then meats. Mineral waters contain sodium chloride and alkaline salts of soda and lime. An excess of any salt may prove irritating and may seriously interfere with digestion. We are not apt to get this over abundance from foods as found in nature, but some artificial mineral waters should not be used for general table use for this reason. Deprivation of salts is not serious unless the diet is so poorly selected that it is deficient in many other ways, then malnutrition may result and this condition may be a predisposing basis for other diseases. Children become rachitic when they are not properly fed, either they do not get enough lime salts in their food or the nourishment which they receive is so poor in everything that they fail to make proper use of what there is. Scurvy results from a diet poor in vegetables, cereals, and fruits. Ignorance is largely responsible for these conditions, poverty is the secondary cause usually. Some of the most important and necessary mineral substances found in foods are sodium chloride, calcium, phosphorus, potassium, magnesium, sulphur, iron and the organic or vegetable acids.

Sodium chloride is a chemical combination of sodium and chlorine. For body use, we need about two grams of this salt daily, most people use fifteen to twenty grams. For normal individuals this is usually harmless, but in certain diseases the use of so large an amount is to be avoided. Although there is enough of this in any well balanced diet, we crave more. Animals crave sodium chloride in the same way. It stimulates the appetite, adds to the flavor of the food, excites thirst, and increases digestive secretions. The chlorine needed in the body is derived almost entirely from the sodium chloride intake. Chlorine is an essential part of the hydrochloric acid in the stomach. This acid is the chief stimulant of the pancreatic juice which has most to do with fat digestion. Sixty per cent of the salt content of the blood is sodium chloride.

Calcium is found most abundantly in animal food, but some vegetable foods and hard waters are also valuable sources of calcium. Milk, eggs, rice, asparagus and spinach are important calcium foods. Adults require less calcium than infants and children as they do not need so much bone building material. Although rickets may not result directly from calcium deprivation entirely, there is no doubt that a rachitic child may be benefited greatly by a diet which is rich in calcium. Calcium also aids in blood coagulation.

Phosphorus is found in the nuclei of all cells. There is no cell growth without it. It enters into combination of bones, muscles and blood. Growing children must have foods which supply this readily. Milk, eggs, beef, haricots, and barley meal are valuable phosphorus foods.

Potassium is needed for the red blood cells and for the muscles. Green vegetables and fruits supply this. Potassium and other basic elements are usually found in these combined with the organic acids. Citric, malic, and tartaric are important organic acids. These substances are valuable as assistants in keeping the blood alkaline.

Although the amount of iron found in the human body is very small, this fact does not lessen its importance. The total iron content of blood pigment is not over one-third of an ounce. Most of the iron in the body is used over and over again. A poorly balanced diet is probably more a predisposing factor in causation of anemia than a diet poor in iron, if the diet is ever directly responsible for this disease. It is generally believed that anemia is more often a result of some other diseased condition. However that may be, we know that a diet rich in iron will improve the condition very materially of many anemic individuals. Foods rich in iron are beef, eggs, oatmeal, rice, wheat, spinach, potatoes, peas, beans, apples and bread.

Sulphur is found in eggs, milk, corn, turnips, cauliflower, asparagus and some other vegetables. Its value to the body does not seem to be very great, but to some people food rich in sulphur seems to be harmful because it produces flatulence.

Dr. Gilman Thompson has summarized the uses of mineral salts in the body as follows:

1. They regulate the specific gravity of the blood and other fluids of the body.

2. They regulate the chemical reaction of the blood and of the various secretions and excretions.

3. They preserve the tissues from disorganization and putrefaction.

4. They control the rate of absorption by osmosis.

5. They enter into permanent composition of certain structures; especially the bones and teeth.

6. They enable the blood to hold certain materials in solution.

7. They serve certain purposes; as the influence of sodium chloride on hydrochloric acid formation, influence of lime salts in favoring coagulation of the blood, and that of iron in formation of blood pigment.

Salts also neutralize acids resulting from digestion and metabolism; they are essential to nervous and muscular reactions; they give tone and vigor to muscular and other soft tissues; they assist in digestion.

Study Helps

Name some food rich in iron.
What tissues are built by mineral water?
Name two diseases that may follow salt deprivation.
Name two minerals which build tissue.
Name three ash constituents in plants necessary for their growth.
In what way are organic salts valuable?
Give two uses of sodium chloride in the body.
Give three uses of the mineral salts in the body.

CHAPTER VIII

FOOD ADJUNCTS

Outline.—

- **Food Adjuncts.**
  - **Definition.**
  - **Uses.**
  - **Flavoring Substances.**
  - **Vinegar.**
  - **Peppers.**
  - **Spices.**
  - **Mustard.**

Food adjuncts are accessories to the diet which supply little or no nourishment to the body, but which are very important substances to stimulate appetite and digestive processes. They give flavor to foods and vary the monotony of the diet. Tea and coffee, condiments and spices, flavoring materials of various kinds are the main food adjuncts. Salt is the only condiment which is essential to health, but most of us have become so accustomed to some of the others that we could hardly eat a meal without them. Tea and coffee infusions, taken without cream or sugar have no food value, but their use has been given in the previous chapter.

Some spices have some medicinal value, but some of them have proved directly harmful to many people because they have used them in excessive amounts. The most useful condiments besides salt are pepper, mustard, vinegar, ginger, cinnamon, cloves, and nutmeg. Sugar is a condiment as well as a food as it stimulates appetite, adds flavor to foods, and furnishes a concentrated form of nutriment. Thyme, bay-leaf, parsley, sage, and mint are aromatic herbs which serve to give more flavor and lessen the monotony of some foods. Flavoring extracts as vanilla, wintergreen, and various fruit substances are used in such small quantities that they have no food value, and are valuable only to increase the palatability of various foods. Baking powders, baking sodas and other similar agents are compounds of chemical and food materials, which are used to change the form of other foods when used in various combinations, as bread and cakes.

Vinegar is a condiment because it is used to flavor foods. It is also a preservative and is used in pickling foods. Vinegar is also useful in softening hard fibres in meat and cellulose in green vegetables, because it is a dilute solution of acetic acid. Vinegar is made from apples, wine, beer, molasses, or is even distilled from wood. The apple and wine varieties are most generally used in this country. Vinegar made from white wine is considered by many people to be the choicest variety. Vinegar has very little use in the invalid dietary, but used in moderation by adults in health it is usually harmless. Vinegar should be kept in glass, wood or stone receptacles, never in tin, as the acetic acid acts very readily upon metals, producing poisonous substances.

Black and white peppers are produced by the same plant; the former is made from the fruit picked before it is ripe, while the white is made from the matured berry. Cayenne or red pepper is used as a stimulant or irritant as well as to give variety to the diet. Peppers are not essential to any one in health. Many people never use them and many more would be better off if they never did.

Spices are purely flavoring materials. Used in moderation they are harmless. Cinnamon is obtained from the bark of a tree growing in tropical climates. Cloves are the dried flower buds of a tropical plant. They contain a volatile oil and considerable tannin. Nutmeg is the kernel of the fruit of a tree growing principally in India. The surface of the nutmeg is coated with lime to prevent the germ from sprouting. Ginger is the root of a tropical plant. It is a food as well as a condiment and is prepared as preserves as well as flavoring substance. It contains a large amount of starch. We use it principally for flavoring foods that would otherwise be more or less insipid.

Mustard is the seed of the mustard plant. There are several varieties. It is used largely in preparation of salads and meat. The seeds are sometimes used as a laxative. Mustard has also medicinal values as an irritant and an emetic.

Study Helps

What is a food adjunct?

Why are salt and sugar both foods and condiments?

Why should vinegar never come in contact with metals?

Give three reasons why you consider condiments valuable additions to the diet of normal individuals.

CHAPTER IX

CARE, PRESERVATION, AND COOKING OF FOODS

Outline.—

- **Surroundings of Food Materials.**
- **Mold and Bacterial Actions on Foods.**
- **Storage.**
- **Care and Preservation of Some Important Foods.**
  - **(a) Milk.**
  - **(b) Eggs.**
  - **(c) Canned, Dried and Pickled Foods.**
- **Changes Produced in Food Materials by Cooking.**
- **Important Methods of Cooking Foods.**

Good foods may be rendered unfit for use in many ways. They may contain one or more food nutrients or even all of them, and yet they may have deteriorated in some way so that these same foods have been converted not only into a harmful but even a dangerous food products. These changes may be produced by the action of bacteria or other microorganisms which have produced poisonous compounds detrimental to health. It is essential to avoid this by keeping all surroundings for food supplies in a sanitary condition. The man or woman who handles the food must be clean and free from transmissible diseases. Foods must be kept away from flies and other insects that can carry disease germs and impregnate the foods in this way. Green foods must not be sprinkled or washed with any but pure water. The storage of perishable foods is also very important. Certain foods will keep easily at a temperature at which others will decay very easily.

Ice boxes in which foods are kept must be kept clean and free from mold. An ice box is only a temporary storage place and must be kept carefully free from products of any age. Some foods such as onions and fish should never be kept in the same ice box as milk and cream. The odor and flavor of the former is absorbed by the milk products and they are spoiled for use. Cooking utensils and stoves must also be kept clean and free from any hiding places for bacteria. Dishes with seams must be carefully watched to see that no food is left from one time until the next along the seams or in grooves of any kinds.

Food is an organic product and thus is subjecet to constant changes. Bacteria and microorganisms cause molds and decay. They also cause serious changes in foods, as ptomaines in cheese, meats, fish and ice cream. This may mean not only illness but death in some family or community. Foods must be removed from the cans as soon as opened. No can of food which gives evidence of a leak should ever be used, as there is also danger of lead poisoning from this source. Bread, cheese, meat, wheat flour and products made from it are particularly susceptible to molds. Some of these molds are useful and some are harmful. Cheese is ripened by the action of the molds; wheat flour and its products are spoiled for food by the action of the molds. The action of molds upon most foods is (1) to render it unsightly; (2) to injure the taste; (3) to cause decay and harmful changes in the food. If the food is kept in a light dry place, molds can not grow, as moisture is absolutely essential to its growth. Ripe fruits are readily attacked by bacteria. If they are kept in a cool, clean place there will be less loss of fruit by decay or mold.

Cellars and places used for storage should be clean, dry and well ventilated. Bacteria and molds flourish in dark, damp, poorly ventilated places.

Milk and milk products have already been discussed in a previous chapter, but as they are among the easiest of all foods to become contaminated, a word or two in regard to prevention of this will not be out of place here. The animal from which the milk is derived must be kept free from disease; it must be kept in sanitary surroundings; it must have good care and food; the receptacles in which milk is handled and the handler must be clean. If milk is to be bottled for future use, instead of being used at the place of production, it must be done with the utmost care and must be put in a cool enough place to prevent bacterial action or spoiling. The milk may be pasteurized or sterilized to render it more safe, but if milk is free from disease bacteria, growth of other organism can be prohibited by a temperature of 45° F.

Eggs can not always be produced by the consumer and sometimes it is very difficult to obtain a good product. Several methods of preservation of eggs, when it is not possible or practical to obtain them, are valuable and do not detract from the value of the eggs. One method commonly used is by use of a liquid glass mixture. The eggs will keep in this preparation for several months. Salt and salt solutions are also used for the preservation of eggs. Cold storage plants also store a considerable number. This is all right when the eggs are fresh at the start and are not kept too long.

Many chemicals formerly used for the preservation of foods are now barred by the pure food laws. Some of these were proved to be harmful. Now food materials which are not kept in the fresh state are canned, dried or pickled. Vinegar is the preservative used in pickling foods. Fruits, vegetables, and some meats are preserved in this way.

Changes Produced in Foods by Cooking

The chemical composition of foods in the raw and cooked forms varies more in water content than in any other way, except in carbohydrate foods. The nutritive value is present in both cases, but in some instances the body can avail itself of these more readily in the cooked state. The structural composition of foods is altered by cooking and the foods are acted upon physically and bacteriologically as well as chemically. Heat acts upon starch and partly dextrinizes it, producing different chemical compounds. Proteins become less soluble by the action of heat, but both proteins and carbohydrates are hydrated and digestibility is aided when they are cooked with addition of fluids. Heat acts more upon the mechanical than upon the chemical structure of most foods. Heat and water together cause partial disintegration of both animal and vegetable tissues. Dry heat causes steam to be developed from the moisture in the food and the tissues are softened. Cooking foods at a temperature of 150° F. or over tends to make foods more sterile, not only killing bacteria and bacterial substances, but destroying animal parasites, such as trichina.

The most important methods of cooking foods are boiling, baking, broiling, roasting, sauteing, steaming, poaching and frying. In boiling foods both heat and water are used. Meats, vegetables, cereals, fruits, eggs and many other foods are prepared in this way. Broiled foods are seared quickly under direct fire. Steaks and chops are best cooked in this way. Bread and pastry are baked. Dry heat at high temperature is used for this method. Meats are roasted usually with the addition of a small amount of water. This is done in a highly heated oven, just as in baking. Sauteing is frying in which a very small amount of fat is used. Frying is not a very good way to cook food for any one; it should never be used for invalid cookery. The food prepared in this way is too rich in fat and usually a hard crust is formed which causes considerable loss of nutritive value in digestion. Poaching is a good method for cooking eggs. The food is dropped into the water, but is kept below the boiling temperature. This makes the protein in eggs very digestible. Steaming is cooking by moist heat. Vegetables are often cooked in this way and there is no loss of food nutrients as there is in boiling foods.

Study Helps

Is there any difference between spoiled and moldy food?

Name three things which may spoil foods for human consumption.

What foods are most subject to ptomaines?

Why should you not put onions and milk in the same ice box?

Name three methods for cooking foods for invalids.

What is the difference between broiling and boiling?

Name one food nutrient that is affected chemically by cooking.

What method of cooking is not considered good for invalids. Why?

CHAPTER X

NUTRITION

Outline.—

- I. Digestion.
    - (a) In the Mouth.
    - (b) In the Stomach.
    - (c) In the Intestines.
    - Factors Influencing Digestion.
- II. Absorption.
    - (a) Lacteal System.
    - (b) Portal System.
- III. Assimilation.
- IV. Elimination.

Digestion

Nutrition of the body is accomplished by several processes, involving both mechanical and chemical action upon the food which is taken into the body. These processes are (1) digestion, (2) absorption, (3) assimilation, (4) disassimilation or elimination. Metabolism is the change that occurs in the food materials that have been absorbed from the digestive tract. Metabolism is constantly going on and if no food is taken into the body, body tissue is lost in this way. Oxidation is the combustion occurring in the tissues from the burning of assimilated food products by means of oxygen. In this way we have produced energy for external or internal work.

Digestion is the action upon the food by which it is changed from an insoluble and indiffusable form into substances which are easily soluble and diffusable. It involves the secretions of fluids in the alimentary canal which have both mechanical and chemical action upon the foods. The food which is to furnish nourishment to the body is taken into the mouth. It must be thoroughly masticated and it will be well mixed with the saliva, one of the digestive secretions. The saliva is secreted by three pairs of glands, the parotid, subingual and submaxillary. It contains an enzyme, ptyalin, alkaline in reaction which acts upon some of the starchy foods, changing starches to dextrose and maltose. The mucin in the saliva coats the food and aids in swallowing. The proteins and fats are not chemically affected in the mouth. If these are properly masticated they are in better condition for digestion in the stomach and absorption will be better also. The flow of the saliva is continuous; about three pints is secreted during twenty-four hours, but the secretion is greatest when one is eating.

The food passes from the mouth through the esophagus into the stomach. The esophagus is merely a connecting passageway and there is no action upon the food in it. The food does not remain in it at all in a normal individual. When the food reaches the fundus, the cardiac end of the stomach, it is acted upon by the gastric juice. This juice contains three important ferments,—pepsin, rennin and lipase. Its flow is intermittent, about three pints daily, and may be excited by physical or psychic means. The food passes on to the central part of the stomach, and is churned about and thoroughly mixed with the gastric juice. This, however, is not a rapid process. The middle stomach serves as a food reservoir for the most of the food. This juice is acid in reaction due to the presence of hydrochloric acid in it. The pepsin and rennin in the gastric juice act upon the proteins and the lipase acts upon the fats. Proteins are partially dissolved and collogen of connective tissue is hydrolized. Pepsin will act only when a certain percentage of hydrochloric acid is present but rennin will act in a neutral solution. The food is forced on to the pyloric end of the stomach and when free hydrochloric acid is present the pyloric sphincter leading into the duodenum opens and the food is forced into the intestines. Only very small amounts of food are ejected each time. Solid particles tend to keep the sphincter closed. When the food has been properly acted upon by the stomach it is a semisolid mass called chyme. For a person in health a liquid diet would not be satisfactory as it would tend to leave the stomach too soon. The cellulose of vegetables and fruits and the residual part of meats is very valuable because they keep the food in the digestive tract long enough to give the digestive secretions time to act upon the nutrients contained in the foods. There is no chemical action upon the starches in the stomach except during the first half hour after the food enters the stomach while the saliva is still active. The hydrochloric acid prevents bacterial action upon the foods and checks decomposition. Meat causes a large flow of gastric juice, usually poor in ferments; bread causes a small amount, rich in ferments; milk causes a moderate flow with moderate quantity of ferments. Thus a mixed diet is acted upon best in the stomach. The average meal leaves the stomach in four to six hours, but this varies very greatly in different individuals. The variety and quantity of food eaten, its preparation, its mastication, the stomach activity, the intervals between meals, peristaltic action, the quality and quantity of digestive juices secreted, and the personal habits and idiosyncrasies of an individual will all influence the rate of digestion and determine the time which is necessary for complete digestion of his food. The intervals between meals must be regulated according to the individual. Invalids, convalescents and young children usually need more meals daily than a normal adult. Some few people may thrive on two meals daily, but others will eat more if a meal is omitted and they will overload the stomach and overtax the digestive system in this way, so that they will not derive as much benefit from the food as it should yield. Some savages only eat once daily but they gorge themselves at this one meal and both stomach and abdomen become much distended from this practice. The stomach has two distinct motions, a churning motion for mixing the contents with gastric juice and a wave-like motion due to peristaltic action by which the food is forced through the alimentary canal. These motions are strongest when the food is in the middle stomach. The greater part of the food taken into the body enters the intestine as a semiliquid substance called chyme.

Digestion occurs principally in the small intestine. When the food enters the duodenum, pancreatic juice, bile and intestinal juice are poured upon it. All of these are alkaline in reaction. The pancreatic juice is secreted only during digestion; the bile has a continuous flow. The bile has no chemical action upon the food. It mixes with the food and holds the fatty acids in solution so that after the pancreatic juice has acted upon the foods, they will be well absorbed. If the bile is lacking or insufficient in quantity much fat will be lost in excretion from the intestines. Without bile fatty foods may decompose and produce gases and foul odors. The digestion of both starches and proteins is completed in the small intestines by the action of the pancreatic and intestinal juices. The food in the small intestine after the action of the digestive juices becomes a milky fluid and remains so its entire length. After the soluble material has been absorbed into the blood the residue passes into the large intestine. There are no digestive secretions here and there is no food digestion although some absorption takes place.

Digestion of food may depend upon many things. Perfectly good food may be lost by the inability of an individual to utilize it. The cause of this may be psychic or physiological. The preparation, cooking and serving of food may affect its digestibility. The appetite, mental state, or personal like or dislike for certain foods have a great deal of influence upon the rate and completeness with which foods are digested. Appetite and hunger are terms which must not be confused. Appetite is a desire for food, usually pleasurable. Hunger is a craving for food, indicating a need for it. Appetite is oftentimes very capricious. The smell, sight or taste of food may influence it. Exercise, pleasant surroundings, congenial companionship, contented mental state usually cause the appetite to be very good. Grief, worry, excitement, fatigue, excessive drug use, irregular habits of eating, physical disabilities, act as depressments upon the appetite. They may also check the flow of digestive juices and hinder digestion.

Absorption

After the food has been made soluble and diffusible it must be absorbed into the blood so that it can be carried to the tissues and furnish material for their growth and repair and fuel for heat and energy production. Food is almost entirely absorbed through the small intestine, although there is some absorption through stomach walls, large intestine, and even through the rectum. Alcohol and some predigested protein product may be absorbed in considerable quantities through the stomach wall. Water and some of the remaining products of digestion which have escaped absorption in the small intestine may be absorbed through the large intestine. By the use of rectal enemata enough food may be absorbed to maintain life for several weeks, when food can not be given any other way.

Absorption in the human body is not a simple process, the greater part of the digested food material is absorbed from the upper part of the small intestine. The walls of the small intestine are covered with innumerable little projections, villi: connected by a capillary network and so-called lacteal spaces. These capillaries converge into larger vessels and eventually form the portal vein which passes through the liver. The lacteal spaces are prolonged into lymphatic vessels which converge to form the thoracic duct. By these two systems by far the greater part of the digested food products are taken up by the blood and carried to the tissues. The digested fats are absorbed by the lacteal system, all other digested products are taken into the portal circulation by the capillaries and are carried to the liver before entering the general circulation. The liver is the store house of the body. Carbohydrate products not needed for immediate use in the body are stored in the liver and are given up gradually as body needs demand. This carbohydrate is an animal starch called glycogen and is converted into glucose before entering the circulation and is sent to the muscular tissues principally. Protein absorption is through the portal vein. Should food albumen succeed in entering the blood stream without being changed into utilizable material it is excreted by the kidneys because it can not enter into tissue formation. Pure fat is absorbed more quickly than fat mixed with other food nutrients. Water and common salt are rapidly absorbed from the small intestine.

Assimilation is a selective process in which the tissues take from the blood only those products which they need and out of these substances form living tissues, either to repair body loss or to cause a growth of the part, or to furnish energy for internal or external work. The circulatory system carries the blood to all the organs and tissues of the body. The end products of all food nutrients enter the blood stream and thus all living tissue is supplied with food.

Elimination or disassimilation is the process by which the body disposes of materials which it does not need. Elimination is through the lungs, kidneys, skin and intestines. All food not digested or absorbed is eliminated from the intestines. Tissue waste and other waste products are eliminated by all four methods mentioned. Nitrogen, carbon, water and salts are constantly lost from actual body composition. The food taken into the body must contain these elements in sufficient quantity to repair these daily losses. In no other way can body equilibrium be maintained.

Study Helps

What is oxidation?

What is metabolism?

Why is a mixed diet advisable?

Name two processes which all foods must undergo before they can be assimilated.

Describe the action of the saliva on the food.

What is peristalsis?

Name four digestive secretions.

Where is each secreted?

What is the action of the bile?

What is chyme? Chyle?

What is the reaction of the saliva? The gastric juice? The pancreatic juice?

Name some things that may influence the digestion of food.

Distinguish between hunger and appetite.

Where does absorption take place mainly?

What is one function of the liver?

What is assimilation?

How does the body dispose of its waste products?

Name some waste products of metabolism.

PART II

CHAPTER XI

FEEDING THE SICK

Outline.—

- **Fundamental Principles to be Observed in Feeding the Sick.**
- **Some "Dos" and Some "Don'ts".**
- **General Hospital Diets.**
    - **(a) Liquid.**
    - **(b) Light-Soft.**
    - **(c) Soft.**
    - **(d) Full.**
- **Methods of Serving Foods.**

Nothing must be more carefully considered by those who have charge of the sick than the food which they are given. Every person, sick or well, is a law unto himself and we must not make the mistake of formulating rigid rules of diet for any patient. However, this does not mean that we may not have lists of foods for general hospital use and for special diseases needing special diet. These lists should contain all foods which may be used to advantage and should be so elastic that one can pick from them the articles needed for individual cases. The diet of both medical and surgical cases needs careful supervision. Errors in diet in either case may seriously hinder or may even thwart the work of the physician or surgeon. The patient must be given the right food and it must be given in the form best suited to his condition. Sometimes patients are not given nutritive material suitable to their weakened digestive powers, and thus they are not able to utilize what is given them. Sometimes wrong food is given through ignorance. These are the things which we must strive to avoid and this problem is much easier for the nurse in the hospital than it is for the person in the home who has not had the training or who has not the knowledge of foods which anyone who takes care of the sick should have.

The physician in charge of any case orders the diet and his orders must be followed implicitly. A nurse must never deviate from these, no matter what her own personal opinion may be in regard to any diet orders. If directions given are not clear, ask for more definite orders: do not guess at them. It is, however, very important that a nurse know that certain foods are harmful in certain diseased conditions and that other foods are beneficial. Thus when no special orders are left by the physician, the nurse may be able to feed the patient intelligently and well until she receives instructions. Do not depend upon the appetite of a sick person as a guide as to the kind of food which he needs. The appetite of those who are ill is often most capricious and sometimes is almost lacking. On the other hand, if a patient has a decided dislike for some article of food, unless it has been ordered specifically by the physician, it is not usually wise to insist upon the patient's taking it. Personal idiosyncrasies must be observed. Some people can not eat eggs without discomfort. This does not detract from the fact that the egg is a perfectly good food, but for people who can not utilize them, they have no value. This same thing may be said about other foods which affect other individuals unfavorably. The food dislikes the patient, hence the patient dislikes the food. Care in the preparation and serving of foods for invalids will aid materially in arousing an appetite and will thus aid greatly the convalescence of the patient. It is often very difficult to improve the condition of some patient because of this lack of appetite. In these cases we must make an extra effort to make everything which we serve particularly appetizing and to make the trays as attractive as possible. A tray should always be tidy. It should never be overloaded, as this in itself will often cause the patient to refuse to eat. The noise and preparation of the tray should be kept away from the patient. The nurse should not direct his attention to the food until she is ready to serve him. Anticipation of good food may be a valuable stimulus to the appetite of a well person, but many sick people react in the opposite way. With the exception of omitting foods which do not agree with the patient or for which he has a personal idiosyncrasy, each tray served will be of more value if it comes in entirely unannounced.

Hospital dietaries for general use must be classified according to the class of foods which shall be given in each. Each hospital has its own system but in general all include about the same foods. Foods may be so classified that four divisions will be ample for this purpose. This will allow for a fluid or liquid diet, a light soft, soft and full diet.

The fluid diet may contain broths, beef juice, fruit juices, milk, raw eggs, cream, starchy fluids as barley water, coffee, tea, cocoa, cream soups, water, Vichy or Apollinaris, acid drinks. Fluid diet is usually used in post-operative cases, in some gastrointestinal disturbances, in nephritis and in other instances when ordered by a physician. Broths are largely water and contain very little nutritive value, so they are given when little food is needed or when the patient can not use the fluids heavier in nutritive value. It would not be possible to feed a patient upon broth alone for any length of time without loss of strength and tissue. When possible to do so the nutritive value of broths may be increased by the addition of eggs, cereals or cereal flours, or milk or cream. Albumin waters and milk contain more nourishment than broths and are valuable for many people during convalescence. Fruit juices are valuable because they are refreshing and quench thirst readily.

A light soft diet will include all foods given in the fluid diet with the addition of gruels, gelatins, custards, soft puddings, ices and ice-creams, toast and butter. From this list a highly nutritious diet with easily digested foods in form easily taken by invalids may be planned. The foods will not require much effort on the part of the patient who has little strength after an operation or a severe illness of any kind, yet it will furnish material to increase his strength daily and hasten his convalescence.

A soft diet includes all articles given in the liquid and light soft diet, and stewed fruit and some stewed vegetables, cereals of all kinds, chicken, fish, lamb chop, bacon, squab, oysters, sweetbreads. No heavy meats or strong vegetables with aromatic or pungent odors should be given. This eliminates most red meats, shellfish, except oysters, cabbage, turnips, onions. Raw fruits with the exception of oranges and grapefruit, and raw vegetables are excluded.

Full diet includes all foods given in the preceding lists and all easily digestible meats, fruits and vegetables. Olive oil may be used on both full and soft diets, as may jellies, jams and preserves, if not too rich. No strong vegetables, fried foods, rich pastry, highly spiced or highly seasoned foods should be given in any hospital dietary. Such foods as lobster, shrimps, cabbage, turnips have no place in the diet for the sick.

The method of serving a tray to a sick person may seem like a small thing but it is a very important thing to know and to observe. Hot foods should be served hot and cold foods cold. Lukewarm food is not attractive to either sick or well people. The tray should be placed within easy reach of the patient and the patient should be made as comfortable as possible at meal time. If the patient has to cramp and twist himself to reach his food the exertion will detract from his appetite in many cases. Meals should be served with the utmost regularity, as should any feeding or medication ordered by the physician. When a meal has been finished all dishes should be removed from the bedside. A soiled glass or spoon should never be left for future use. Sick people may not always speak of these things, but that does not mean that they do not notice them and that these things may worry them.

Study Helps

What is meant by "personal idiosyncrasy"?
Give foods that may be allowed on a typical light soft diet.
What foods should never be served to sick people?

What details should always be observed in serving food to the sick?

Of what value are diet lists?

In what ways may the appetite of a sick person be improved in some cases?

Why should a patient receiving fluids only be fed more often than a patient receiving a full diet?

CHAPTER XII

DIET FOR INFANTS AND CHILDREN

Outline.—

- **Modification of Cow's Milk for Infant Use.**
- **Proprietary or Prepared Infant Foods.**
- **Gruels.**
- **Rules for Infant Feeding.**
- **Diet for Children Two to Six Years Old.**
- **Rules for Feeding.**
- **Diet for School Children.**

As it is often necessary to substitute artificial for natural feeding of infants, it is highly essential that a nurse should know the best methods and rules underlying artificial feeding. The supervision of the diet of the infant is in charge of the physician but the nurse prepares and gives the feeding. Statistics show that the breast fed babies are stronger and have a greater resistance to disease than artificially fed babies. Infant mortality is much greater among the latter. However, it is often impossible for a mother to feed the child and it is necessary to find for each individual baby the food which will best meet its needs.

Plain cow's milk differs materially from human milk and the majority of infants are unable to use it advantageously without modification. Cow's milk contains 3.5% protein, 4.5% fat and 4.5% carbohydrate. Human milk contains 1.5 to 2% protein, 6 to 7% fat and 4% carbohydrate. Human milk is alkaline or neutral in reaction, while cow's milk is acid. The young calf grows so very rapidly that the high protein is well utilized. In order to reduce the protein for the use of infants, the milk must be diluted. This also dilutes the fat and carbohydrate. All the nutrients must be regulated according to the needs of each individual child. The carbohydrate content may be raised by the addition of dextrin maltose, cane sugar or lactose. Dextrin maltose seems to give better results than any other sugar. The addition of cream will raise the percentage of fat. Lime water or potassium bicarbonate are sometimes added to modified cow's milk to make it alkaline. In cases of temporary indigestion, lime water added to milk makes it more easily digested by some children. It causes the milk to form smaller curds in the stomach, and gives the stomach less work to do.

Barley water is used as a diluent for milk in cases when infants vomit the milk. This is usually only a temporary measure. As a rule, after a period of rest most infants are able to take the original formula; in cases where the use of barley water must be continued the proportion is lessened as the child grows older. Barley water is valuable in cases of diarrhea and oatmeal water for constipation. Buttermilk feedings have been used very successfully of late years when a diet low in fat and sugar was desired. It has been very valuable in some intestinal troubles. Eiweiss milk is a milk preparation heavy in protein content. Whole milk is clotted with pepsin, then heated and the whey strained off. The curd which is left is finely ground or strained and mixed with sterile water and buttermilk. This mixture is low in sugar and in fat. Its food value is about one-half that of whole milk. Flour-ball and dextrin-maltose are sometimes added to Eiweiss feedings.

Proprietary or prepared foods are sometimes very valuable for temporary use. Most of them are high carbohydrate foods with a small percentage of fat and children fed upon them exclusively are apt to develop rickets and sometimes scurvy. The value of many of these foods, however, becomes much greater when they are used with cow's milk in the proper proportions. They should never be given to children unless ordered by the physician. Some of these malted foods are useful in cases of chronic constipation.

Gruels made of oatmeal and farina are very valuable foods for babies after the first six or eight months. Very young infants have no ptyalin in the saliva and thus starches can not be utilized well. The carbohydrate in these products differs so widely from the lactose or milk sugar that it is doubtful whether it is assimilated at all by children in early infancy. For older children the gruels must be very thoroughly cooked and strained. Little or no sugar is added to them when they are served. The addition of milk raises the protein and fat content and lowers the carbohydrate.

Overfeeding of infants is a very common error and one which is responsible for many illnesses and deaths. This is usually done through ignorance. A crying baby is not always a hungry baby. The capacity of the infant stomach is as follows:

Premature infant	8 c.c. to 15 c.c.
Infant 5 days old	1 ounce
Infant 4 weeks old	2.5 ounces
Infant 8 " "	3 "
Infant 16 " "	4.5 "
Infant 20 " "	5.5 "
Infant 6 months old	6 "

These figures are approximate for the average child, but we all understand that the size and physical condition of the child will determine the deviation if any is needed from such a table. Sick babies are not normal and no rule has been made which will suit them in general. We must feed every child according to its needs, using the daily weight, the condition of the child and the stools as guides. Regularity of feeding is absolutely essential. If the physician has set three hour intervals for feeding, this must be adhered to strictly. Very young children are fed at intervals of three to four hours usually.

During the second year of life children must also be very carefully fed. Holt believes that it is better to decrease rather than to increase the food of a baby during its second summer, especially if the child is fretful or ill. The diet during the second year should consist of milk principally. Orange juice, strained gruels, broth, a very soft cooked egg, zweibach, junket, scraped beef, well baked potato may be added to the diet during the second year.

The child's diet from now on should be gradually increased up to the fifth or sixth year. Milk should still be given plentifully. Easily digested vegetables as spinach, carrots, asparagus tips and cauliflower may be given once a day. Fresh bread, cake, pancakes, raw vegetables, fried foods, pastry, tea, coffee, bananas, heavy meats, salted fish, should not be given to children under four years of age. (Holt.)

Dr. Gilman Thompson gives the following very excellent rules for feeding young children:

1. Allow ample time for meals.

2. See that the food is thoroughly masticated.

3. Do not allow nibbling between meals.

4. Do not tempt the child with the sight of rich and indigestible food.

5. Do not force the child to eat against its will, but examine the mouth which may be sore from erupting teeth or stomatitis; and examine the food, which may not be properly cooked or flavored. If good food is refused from peevishness merely, remove it and do not offer it again before the next meal time.

6. In acute illness reduce and dilute the food at once.

7. In very hot weather give about one fourth or one third less food and offer more water.

8. Children who persist in eating too rapidly should have small quantities of food put on their plates at a time, and should be given small sized forks and spoons, instead of the larger adult's size.

The feeding of school children is receiving more attention of late years than ever before. We realize that it is difficult to do mental work when the physical needs of the body are neglected. Good nourishing food which will produce stronger bodies will produce good brain power in a normal child. Some cities have trained women in charge of the lunch which they furnish daily to school children at a very low cost. School children are very active, their growth is rapid; their tissue waste is great. A good liberal diet with plenty of tissue-making food is imperative. As much variety of food as it is possible to get will keep the appetite keen and vigorous; monotony will often indirectly be the cause of the undernourished condition of many children, as loss of appetite and a positive dislike for good nourishing food will follow a lack of variety in the diet.

School children may be taught to eat many foods which they have formerly refused if they are prepared attractively. Fried foods, rich pastry, highly seasoned or spiced foods, strong tea and coffee, indigestible meats should be omitted from their dietary. Sweets are craved by many children and if these are provided with meals, most children would not care for candies and sweets between meals. Caramels, chocolate, syrups, honey, jellies, preserves and jams are useful to satisfy this demand. Simple desserts may be made with considerable variety which will also meet this need. The child should always be given sufficient time for eating each meal. Reading or studying immediately after a meal is difficult and detrimental to the child. His digestive processes require an extra supply of blood at this time and this can not be accomplished so well if the brain is also demanding an extra supply.

Study Helps

How does cow's milk differ from mother's milk?

What is lactose?

What is modified milk?

Mention some foods that are often given to infants when they are unable to digest milk.

How would you reduce the protein in cow's milk?

When would you give starchy foods to a healthy infant?

Why is lime water sometimes added to milk?

How much food would you give to a week old baby at one feeding?

How often would you feed it?

What is Eiweiss milk?

What is the principal objection of proprietary foods?

Name some foods that should never be given to very young children.

Give some good rules to be observed in the feeding of children.

Why should great attention be paid to the diet of school children?

CHAPTER XIII

DIET IN DIABETES

Outline.—

- Symptoms of Diabetes.
- Diabetic Urinalysis.
- Foundational Treatment.
- Carbohydrate Tolerance.
    - Carbohydrate Substitutes.
- Methods of Dieting.
    - Dr. Allen's System.
    - Dr. Joslin's Plan.
    - Von Noorden's Oatmeal Diet.
    - Diet List for General Use.
    - Accurately Weighed Diets.
- Complications in Diabetes.

Few diseases yield so readily and so rapidly to dietetic treatment as diabetes. It is a disease benefited essentially by diet and by hygiene as no medicinal substance is known which is of much service in the treatment of this ailment. Successful feeding of diabetes depends upon many things;—upon the age of the individual affected, upon his physical and mental condition, upon his cooperation in the treatment, upon the severity of the disease, and upon his surroundings. Diabetes is a disease of metabolism in which the body is unable to utilize carbohydrates. These are excreted in the urine in the form of sugar, usually glucose. Diabetes must not be confused with a temporary glycosuria which may result from overindulgence in sweets. Diabetes is rarely if ever due to this cause. In many cases it is hereditary. The symptoms vary with different individuals; but in general, we may say that excessive thirst, excretion of a very large quantity of urine, an abnormally large appetite, a craving for sweets and starches and loss of weight are typical of this disease. There are so many stages of the disease and it behaves so variably with different individuals that it is impossible to plan a diet or series of diets that will be of value to all individuals suffering with diabetes. Each case must be studied and dealt with according to its needs. The only way in which this disease can be successfully diagnosed and treated is by urinalysis. The important things to be learned from this are (1) the quantity of sugar in the urine, (2) its specific gravity, (3) the quantity of urine, (4) the presence or absence of acetone bodies, (5) the presence or absence of diacetic acid, and (6) the amount of ammonia in the urine. To successfully treat a case of diabetes by diet all of these points must be carefully watched. A normal urine contains no sugar, acetone bodies or diacetic acid. The amount of urine excreted by a normal individual is from two to four pints daily and its specific gravity varies from about 1012 to 1020. The diabetic may excrete three or four quarts of urine, or even more, daily. The specific gravity may be as high as 1036 to 1040. The normal urine contains not over .3 grams of ammonia in each 100 cc; the diabetic urine may contain several times this amount. When the quantity becomes very great there is grave danger that the patient may go into coma. Thus it is apparent that the urinalysis must be our guide in the dietetic treatment of diabetes. This disease is quite common, occurring most often, however, in people in middle age or older. The disease is usually more severe when it occurs earlier in life. The prognosis for children so affected is usually bad and the disease usually runs its course within two to four years, many times in a few months.

The dietetic treatment of diabetes has undergone many changes in the last few years. While few physicians claim to be able to cure many cases, still many have different theories of the best method for feeding those with this disease. The foundational treatment used by all is practically the same. They first endeavor to free the urine of sugar, then they endeavor to establish the proper diet necessary for the maintenance of the strength, weight and the satisfaction of the needs or cravings of the patient.

In most cases of diabetes the carbohydrate tolerance of the patient is found to be from one-sixth to one-fourth of the normal diet. In many cases it is much less. The daily diet of the normal individual contains from 450 to 550 grams of carbohydrate. The carbohydrate given to different diabetic patients can not always be the same as the different foods are not utilized in the same way by all individuals. Some must take their carbohydrates in the form of vegetables and fruits only, some are able to use a measured amount of bread, potato or oatmeal. These things have to be determined by actual study of each case.

Substitutes for the foods which must be denied to different patients are very valuable. Saccharin may be substituted for sugar to sweeten the food, but it will not take its place in furnishing food value. If saccharin is used in very small quantities it will sweeten the food very agreeably; if used in large amounts it will give a bitter taste to the food. Saccharin is a coal tar product. It is very concentrated, being 300 times as sweet as sugar. Bread substitutes are also very valuable in some cases where the carbohydrate tolerance is very low. Bran muffins (made from bran, not bran flour), almond muffins, Lister bread, and some casein and soy bean products have been used very successfully in some cases.

The dietetic treatment of diabetes is very interesting. It is handled very differently by different physicians and dietitians. A few years ago Dr. Allen inaugurated a method in which the patient fasted until sugar free, then his diet was increased very slowly and carefully until his exact tolerance of proteins, fats and carbohydrates was determined. This method with modifications has been quite widely and successfully used. During the fast days the patient may have plain broths, and black coffee or tea without cream. Sometimes brandy or whiskey in small amounts is given.

Dr. Joslin has had printed for his own use, and for the benefit of his patients and other workers, a very valuable little card. This card* gives the percentage of carbohydrate which many foods contain. It also gives an estimate of the amount of the different nutrients contained in one ounce or thirty grams of some common foods and their caloric values. I consider it very valuable for nurses as well as for physicians, dietitians, and patients, so I am going to insert it here:

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*Issued by Thomas Groom & Co., Inc., 105 State street, Boston, Mass. Form J6.

STRICT DIET

Meats, Fish, Broths, Gelatine, Eggs, Butter, Olive Oil, Coffee, Tea and Cracked Cocoa

Foods Arranged Approximately According to Per Cent of Carbohydrates

VEGETABLES

5%		10%	15%	20%
Lettuce Spinach Sauerkraut String beans Celery Asparagus Cucumbers Brussels sprouts Sorrel Endive Dandelions Swiss chard Sea kale	Cauliflower Tomatoes Rhubarb Egg plant Leeks Beet greens Water cress Cabbage Radishes Pumpkin Kohl-rabi Broccali Vegetable marrow	Onions Squash Turnip Carrots Okra Mushrooms Beets.	Green peas Artichokes Parsnips Canned lima beans	Potatoes Shell beans Baked beans Green corn Boiled rice Boiled macaroni

FRUITS

Ripe Olives (20% fat) Grape Fruit	Lemons Oranges Cranberries Strawberries Blackberries Gooseberries Peaches Pineapple Watermelon	Apples Pears Apricots Blueberries Cherries Currants Raspberries Huckleberries	Plums Bananas

NUTS

Butternuts Pignolias	Brazil nuts Black walnuts Hickory nuts Pecans Filberts	Almonds Walnuts(Eng.) Beechnuts Pistachios Pine nuts	Peanuts 40% Chestnuts

MISCELLANEOUS

Unsweetened and Unspiced Pickles, Clams, Oysters, Scallops, Liver, Fish, Roe	Reckon available carbohydrates in vegetables of 5% group as 3%, of 10% group as 6%.

30 grams = 1 oz.	Contain Approximately Protein grams	Fat grams	Carbohydrates grams	Calories grams
Oatmeal, dry weight	5	2	20	110
Meat (uncooked)	6	2	0	40
Meat (cooked)	8	3	0	60
Broth	0.7	0	0	3
Potato	1	0	6	30
Bacon (cooked)	5	15	0	155
Cream, 40%	1	12	1	120
Cream, 20%	1	6	1	60
Milk	1	1	2	20
Bread	3	0	18	90
Butter	0	25	0	240
Egg (one)	6	5	0	75
Brazil Nuts	5	20	2	210
Orange (one)	0	0	10	40
Grape Fruit (one)	0	0	10	40
Vegetables, 5-10% groups	0.5	0	1	6

1 gram protein . ... 4 calories
1 " carbohydrates . .... 4 "
1 " fat . ... 9 "
1 " alcohol . ... 7 "

6.25 grams protein contains 1 gram *nitrogen.*

1 kilogram=2.2 pounds.
30 grams (g) or cubic centimeters (c.c.)=1 ounce.

A patient "at rest" requires 25 to 30 calories per kilogram body weight.

Observation of this chart will show that the foods which are properly classified under a strict diabetic diet are those vegetables and fruits which do not contain over five per cent of carbohydrate and a few of the fruits and vegetables containing ten per cent of carbohydrate with the addition of certain protein and fat foods. The diet list for diabetics most generally used is as follows:

Soups—Meat broth; cream soups made with cream and vegetables.
Meats—Beef, lamb, chicken, squab, fish, ham, bacon, caviar.
Vegetables—Spinach, lettuce, cabbage, cauliflower, Brussels sprouts, sauerkraut, asparagus, string beans, celery, onions, cucumbers, egg plant, tomatoes, chicory, water cress, romaine, radishes, rhubarb, broccali, vegetable marrow, Swiss chard, mushrooms, endives.
Fruits—Grapefruit, gooseberries, rhubarb, lemons.
Fats—Butter, olive oil, cream, bacon.
Beverages—Coffee, tea, lemonade (sometimes buttermilk).
Desserts—Custards made with cream; gelatines flavored with wine, cream, coffee and nuts, and sweetened with saccharin; and fruits mentioned above.
Eggs—In any form.
Nuts—Small amounts of almonds, English walnuts, filberts, pecans, black walnuts, butternuts.
Relishes—Ripe and green olives, sour pickles.
Breads—Almond muffins, and bran biscuits.
Cheese—All kinds.

Von Noorden has successfully treated many cases of diabetes by the so-called "Oatmeal Diet." On this diet the patient is given a porridge made of 250 grams of oatmeal, 100 grams of egg or vegetable albumen and 200-300 grams of butter. This diet has not been used very extensively in this country during the past few years, but some physicians report wonderful success with it in some very severe cases. On account of the large amount of fat which it contains its use would be contraindicated in cases of severe acidosis.

The amount of protein, fat or carbohydrate needed by different individuals varies greatly. Some diabetics will produce sugar from proteins as well as carbohydrates, so they will need a low protein diet. In some cases fats are poorly borne and a low fat diet must be given to avoid acidosis. Many individuals with diabetes do very well and are able to lead a very normal existence on the strict diabetic diet given previously. From this diet many attractive menus and articles of diet may be prepared. A schedule from this list of one day's menu which may be used advantageously by many diabetics is as follows:

BREAKFAST: One half grapefruit or an average serving of rhubarb sweetened with saccharin, one or two eggs, two or three strips of bacon or small serving of ham or fish, coffee, cream, butter, bran muffin (if any bread is allowed).

DINNER: Stock soup or broth, or cream soup made with cream and vegetables, meat from list given, olives, two vegetables (5 or 10%), one green salad, diabetic dessert, coffee or tea, cream, butter, diabetic bread or muffins (if allowed by physician).

SUPPER: Small serving of cold meat or lamb chops or eggs or fish, two vegetables (5 or 10%), one salad, diabetic dessert, coffee or tea, cream, butter, bread (if allowed).

For some diabetics it seems to be absolutely essential that all food be given in exact amounts. In these cases the weighed amounts of different foods must be computed so that the patient will receive the exact allowance of protein, fat or carbohydrate which will best maintain his strength and health. These cases are usually the more severe ones and are more successfully handled in hospitals than in homes. Sometimes when patients have improved enough to be able to go home they can be taught to observe the quantities of food which they have received so that they are able to approximate the amounts very accurately.

Sometimes diabetes is complicated by other diseases. Then the treatment is more difficult. Diabetic patients are usually quite susceptible to infections, so it is very necessary that each one be given a diet as carefully chosen and planned for his individual needs as it is possible for one to make. In this way his powers of resistance will be strengthened so that complications will not affect him disastrously. Carbuncles and boils and even gangrene in diabetic patients will yield much more readily to medical treatment if the dietary needs of the patient are carefully observed so that his urine is kept sugar free.

Study Helps

What are carbohydrates? Name some important carbohydrate foods.

What is diabetes? Glycosuria?

What are some of the symptoms of diabetes?

Why should a nurse learn to read a diabetic urinalysis intelligently?

Why is diet in diabetes so valuable?

Would you feed every diabetic patient on the same diet? Why not?

What is saccharin?

Name some vagetables that you would give to most diabetics.

Why wouldn't you give bread, oatmeal or potatoes on a strict diabetic diet?

Outline one meal for a diabetic patient.

Why are starches as well as sugar excluded from a diabetic diet?

CHAPTER XIV

DIET IN NEPHRITIS AND IN HEART DISEASE

Outline.—

- Symptoms of Nephritis.
- Diet Indications.
    - Milk Diet.
    - Diet Low in Nitrogen.
        - Daily Dietary.
        - Arrangement of Meals.
    - Complications in Nephritis.
        - Diet Poor in Salt.
        - Fluid Restriction.
- Diet in Heart Disease.
    - Fluid Needs of Patient.
    - Small and Frequent Meals.
    - "Salt Free" Diet.
    - Use of Alcohol.

Diet in Nephritis

Nephritis is a disease of the kidneys characterized by a persistent loss of albumen through the excretion of the urine. The urinalysis may also show the presence of blood and casts in the urine. The causes are many but we are interested here in the measures which will correct the trouble more than in the origin of the disease. It is not a disease caused by error in diet, but it is one which may often be benefited appreciably by diet. The quantity and quality of food which we eat influence the urine but they do not directly cause changes in kidney structure unless the structure is already damaged. Foreign substances such as some poisonous drugs and toxins from certain infectious diseases will cause an inflammation or derangement of the kidneys which may be permanent. Many cases of acute nephritis in children are due to attacks of diphtheria, scarlet fever or acute tonsillitis. In these cases the diet must be carefully chosen so that the damaged kidneys may be relieved of all strain and in many cases a complete cure may be effected.

Some people seem to inherit a weakness of the kidneys which is favorable to the development of nephritis. With these individuals overfatigue, overindulgence in highly seasoned and indigestible protein foods or alcoholic beverages serves to break down the weakened structure and chronic nephritis results. In this disease the system has difficulty in utilizing protein foods, especially animal proteins, with the exception of milk. Under normal conditions the protein which we eat is digested and absorbed and enters the blood as blood albumin. Then it is carried to various parts of the body where it is utilized as needed. In nephritis blood albumin is excreted in the urine and is thus lost to the body. This loss of body nitrogen is serious and if long continued the kidneys become unable to carry off the waste material and the patient may become toxic. Diet is of more value in most cases of nephritis than medicine. Careful dieting will relieve most cases of chronic nephritis and will cure many cases of acute nephritis.

As heavy nitrogenous foods act as poison to the sufferer with nephritis we proceed in the same manner to treat him as we do the person with diabetes who has been poisoned by sugar. We remove the cause and substitute foods which will best meet the needs of each patient. We can not feed in the same way all patients having nephritis any more than we can feed all diabetics alike. In any disease we must diet the individual, using certain general principles as our guide.

Some cases of acute nephritis are benefited very greatly by a milk diet. Milk, fruits, and vegetables increase the alkalinity of the urine; meat and eggs tend to make it more acid. Four to seven pints of milk daily should be given on a milk diet. It is usually given at frequent intervals. If milk is not well borne it may sometimes be diluted with limewater or vichy, or buttermilk or koumiss may be substituted for it. In some very acute cases of nephritis where there are also gastrointestinal disturbances, it may be necessary to peptonize the milk. A milk diet may be given for only a few days or it may be used for several weeks. The condition of the patient and the nature of the urinalysis are usually the physician's guides. The return to solid foods is usually slow. Carbohydrate foods as gruels, and cereals or cereal puddings are usually added first; then other farinaceous foods, then vegetables and fruits. In some cases the patient is allowed a small amount of animal foods, in other cases none can be utilized.

In the majority of cases of chronic nephritis, the patient does not necessarily need to be put upon the milk diet entirely. With many people it would be both impossible and impractical. Many nephritics are able to keep up their occupations and by careful diet, their strength and health is kept adequate. Some of these people must eliminate meat and eggs and the heavy vegetable proteins from their diets entirely, others must limit them. The careful physician studying his cases individually is able to guide them in regard to this.

It is necessary for us to have some general guide for dietary treatment of nephritis. From the following list, from which heavy animal foods have been eliminated, it is possible to feed a patient with nephritis for an indefinite period. Many people have lived upon this diet for years and have really thrived. It is certain that the lives of many of them have been prolonged for years as the advance of their disease was checked.

Diet Low in Nitrogen

Cream soups, except cream of peas and beans.
All kinds of fresh and stewed fruits.
Vegetables—Potatoes, squash, carrots, beets, cabbage, cauliflower, sauerkraut, Brussels sprouts, lettuce, spinach, celery, romaine, water cress, artichokes, cucumbers, tomatoes, mushrooms, asparagus, radishes, onions.
Fats of all kinds—Butter, cream, olive oil.
Sugar in abundance.
Bread—White bread, toast, zwiebach, crackers.
Cereals of all kinds in moderate amounts.
Beverages—Water, milk, cocoa, buttermilk.
Meats (if any are allowed)—Fish or chicken once daily.

From this list a daily dietary of from three to six meals may be prepared, according to the condition of the patient. Some will need small meals at frequent intervals, while others will find three meals with a light lunch of a glass of milk, buttermilk, or fruit juice between meals adequate for their needs. In general it is better for a person with nephritis to take his heavy meal in the middle of the day and a light meal in the evening. A good schedule is as follows:

BREAKFAST: Fruit, cereal with cream, cocoa, toast or bread, butter.

LUNCH: Glass of milk or malted milk or buttermilk or fruit juice.

DINNER: Cream soup, potatoes (mashed, boiled or baked), cooked vegetable (as listed), vegetable or fruit salad with oil and lemon juice, soft pudding or fruit or ice, cocoa or milk, bread and butter. Jelly, preserves or other relish may be added, or celery or olives.

LUNCH: As in forenoon.

SUPPER: Cooked cereal with cream or milk, cooked vegetable or a salad, sweet or white potatoes, fruit, cocoa, toast or bread, butter.

A glass of milk, hot or cold, or buttermilk, or malted milk may be of advantage to some patients before retiring. It will often give a patient a better night as some people do not sleep well if they go to bed at all hungry.

Complications in nephritis are commonly edema, heart disease, anemia or gastrointestinal disturbances. Any of these will necessarily demand different procedure in dieting. Some times it is necessary to restrict the fluid intake in order to get rid of water in the tissues or to lessen the strain on the heart. Sometimes a salt free diet, in which no added sodium chloride is given in the patient's food is very valuable. Some patients who have naturally very poor appetites, become so anemic upon the so-called nephritic diet that it is better to add small quantities of animal foods, meat or eggs, to the diet. Milk is poor in iron and so it does not directly help to lessen an anemic condition. Every case of nephritis needs careful individualization.

Diet in Heart Disease

The diet in heart disease needs very careful attention as distress or disease of the stomach complicates the treatment of the heart. There are many diseases of the heart that can be influenced and benefited directly by diet. In general the principles for dieting are the same and individual cases must determine necessary deviations. The amount of fluid needed by each patient must be determined. An excess of fluid intake may overtax the weakened heart muscles, raise the blood pressure, or cause an increased edema in various parts of the body. Too little fluid may lower the blood pressure to a danger point or it may cause an insufficient urine excretion. The physician in charge of the case determines how much fluid his patient needs and either specifies the exact nature of the fluid to be given or leaves that to the discretion of the dietitian or nurse in charge of the diet.

The patient with a chronic heart disease always maintains a better physical condition upon a carefully selected diet. This does not mean that the same foods will benefit all patients, because we know that in every case personal idiosyncrasies must be observed. It means that certain lists of chosen foods may be given to the patient and from these a diet which will meet the needs of the patient can be planned. In general, small meals of simply cooked and seasoned foods given at frequent intervals are the best for these patients. In this way four or five meals may be taken daily. The intervals between the meals should not vary much. The evening meal should be very light. Foods which ferment and form gas readily in the stomach should not be given, as this tends to crowd and distress the heart. Sometimes it is necessary to give the patient a "salt free diet" in order to lower his arterial tension and to prevent edema or to get rid of it. Children with heart disease should be taught to eat slowly and to masticate all food thoroughly before swallowing. If heart disease is a complication of nephritis the diet given earlier in the chapter is the best that can be given. When meat can be given, we should give only those that are most easily digested as—fish, chicken, scraped beef, lamb chop, or tender steak or roast beef. No fried foods of any kind should be allowed. Eggs, meat soups, and gelatine puddings are light and nutritious and valuable foods for some patients. Heavy vegetables such as cabbage, turnips, onions and legumes should not be given. Condiments should be used very sparingly. Highly seasoned foods, pastries, spices, and tea and coffee should be forbidden. Alcoholic beverages should never be used unless prescribed by a physician. The diet list on page 109 with the addition of the foods mentioned in some cases and with the restrictions given in others is a good list for the use of patients with chronic heart disease.

Study Helps

Why should the diet of a patient with scarlet fever be very carefully supervised?

What is "blood albumin"? How is it different from "food albumen"?

Name some foods that should not be given to a patient with acute nephritis.

What are the heavy nitrogenous foods?

When is a milk diet usually given?

What is peptonized milk?

Outline a dinner for a nephritic patient.

When is a salt free diet needed?

When are fluids restricted? Why?

Why is diet important in heart disease?

Why are small meals better for a patient with heart disease?

Why do we not give vegetables like cabbage and turnips to some patients?

In what way does thorough mastication of food benefit, especially the individual with heart disease?

With what disease is heart disease often associated?

CHAPTER XV

DIET IN DISEASES OF THE STOMACH AND INTESTINES

Outline.—

- **Dyspepsia and Indigestion.**
  - **Dietary Treatment.**
- **Malignant Growths.**
- **Diet for Hypersecretion.**
- **Diet for Hyposecretion.**
- **Lists of Easily Digested Foods.**
- **Diet Rules.**
- **Gastric Ulcer.**
  - **Dietary Treatment.**
  - **Gastrointestinal Diet.**
- **Constipation.**
  - **Dietary Treatment.**
  - **Use of Cathartics.**
- **Diarrhea.**
  - **Dietary Treatment.**
- **Flatulence.**
  - **Cause and Effect of.**
  - **Dietary Treatment.**

The function of the stomach and intestines as the main part of the alimentary or digestive canal is to take care of the food substances which are eaten. In order to keep them in good condition we must eat the foods which our individual tracts can handle with the greatest ease and thoroughness. Many people suffer from ailments known as dyspepsia and indigestion. These may be temporary or they may be secondary to some diseased condition of some digestive organ or some other part of the body. There is no doubt that a strong sympathy exists in parts of the body, not necessarily closely related, which will often cause gastrointestinal disturbances when the digestive organs are not affected. When people are exceedingly nervous or worried or overfatigued this often occurs. In these cases diet and rest are of far more value than medicine in restoring these organs to normal conditions.

The diet which will be given in any case of functional or other derangement of stomach or intestines, regardless of the cause of the trouble, will depend upon the ability of the patient to digest various foods and upon his tastes or personal idiosyncrasies. To force any food to which a person has a positive dislike is worse than useless in the majority of these cases. The food given must furnish abundant nutrition with little or no physical discomfort. In cases of organic disease this is much more difficult for as some diseases progress it is almost impossible to feed without giving some distress. This is particularly true in cases of malignant growths. Then we must give only the lightest, most easily digested foods and give the patient the most nourishment that we can with a minimum of pain. Diet will not cure these cases, nor will any medicine of which we know at present; but careful supervision of the diet will give these people much relief.

Most stomach troubles are due to or are accompanied by either a hypersecretion or a lessened secretion of gastric juice. By test meals and gastric analysis physicians have been able to learn the acidity of the stomach secretion. In cases where there is an overabundance of hydrochloric acid, a high protein diet is usually given as this neutralizes the excessive acid. In cases of lessened secretion, a high carbohydrate diet is advisable as protein foods lying in the stomach undigested are sure to give discomfort. In both cases some fat is usually given in order to raise the caloric value of the diet. However, there are cases in which very little fat can be utilized. If the patient is resting in bed he will need much less food than the individual who is up and about his work.

In preparing diets for these patients a knowledge of some of our most easily digested foods is very important. Broth, milk, and raw or soft cooked eggs are about the easiest and most readily digested foods that can be given. Well cooked chicken, squab, gruels, scraped beef, mashed potatoes and chopped or strained spinach rank next. The length of time which various foods need for digestion in the stomach is also of great importance. The time needed by some of these is as follows:

Plain meat broth.	1 -2	hr.	Carrots	1 -2	hr.
Milk . .....about	2	"	Cereals	1 -3	"
Raw eggs	1 -2	"	Gelatin	2½-3	"
Soft cooked eggs..	1 -2	"	White bread	3 -4	"
Well " chicken	3	"	Zwiebach	3 -4	"
Gruels	1 -2	"	Butter	3 -4	"
Irish potatoes ...	2½-3½	"	Boiled or broiled beef	3 -4	"
Spinach	1 -2	"			

Dyspepsia or indigestion are often due to rapid eating and poor mastication of food or to irregular hours of eating. Persons with stomach troubles should eat slowly, masticate all food well, so that it will be finely divided and thoroughly mixed with saliva, have regular hours for meals and no midnight suppers, avoid extremes of hot or cold in foods, and rest after meals if possible. They should take fluids before and after meals rather than with them. They must avoid constipation at all times.

One disease of the stomach which needs dietetic treatment especially is gastric ulcer. The nature of the ulcer must determine the diet. Some are slight, while others are very deep and bleeding may result from the slightest provocation. There are many methods of treatment and good results have been obtained from many of them. The principle underlying all of them is the same. The patient must rest in bed. He must be given only the very simplest of foods, usually fluids or bland foods. Small amounts at frequent intervals are given at first and quantities and intervals of feedings are increased very slowly and carefully. Some physicians give alkalies with the dietetic treatment in order to neutralize any hyperacidity that may be present. When there has been considerable hemorrhage it is often necessary to give the stomach complete rest. Then all food must be given for a time by nutrient enemata per rectum. The physician in charge of the case always leaves most explicit orders and the nurse must follow these exactly. Sometimes the patient is unable to retain milk. As this forms the basis of most gastric ulcer diets, various methods of modification must be tried. The milk may be diluted with lime or barley water or it may be peptonized. If this does not help, other foods may have to be substituted. Koumiss, buttermilk, egg white and cereal gruels are often valuable. The diet of the patient with a gastric ulcer is increased very slowly. The physician is guided entirely by the condition of his patient. For a long time following any treatment the patient must be very careful what he eats as there is always danger of a recurrence. For this reason the patient should live upon only the most easily digested, simply cooked and prepared foods for many months. Foods selected from the following list are best for most cases:

GASTROINTESTINAL DIET

Toast—Dry or buttered, 6 slices daily.
Butter—40 gm. daily.
Eggs—3 to 4 daily. Soft boiled or poached.
Meat—Scraped beef or finely minced chicken, meat or fish.
Vegetables—Strained peas, tomatoes, carrots, spinach, corn, asparagus tips, lima beans; or purees of same.
Soups—Cream soups made with the above vegetables.
Potatoes—Mashed only.
Cereals—Thoroughly cooked and strained.
Desserts—Gelatin, custard, soft puddings, strained fruits or fruit juices, junket.
Milk—In cream soups, eggnogs, cocoa; buttermilk, 1 quart daily; peptonized milk.

A diet from this list arranged in from four to six meals daily is the best. The patient should not have too much variety at any meal. The heaviest meal should be taken in the middle of the day. The daily menu may be arranged as follows:

BREAKFAST: Strained fruit, strained cereal with cream, one egg (soft cooked), cocoa, toast and butter.

LUNCH: (Middle of forenoon) Milk with crackers or zweibach.

DINNER: Cream soup, scraped or finely divided meat, mashed potatoes, vegetable puree, soft pudding, cocoa, toast, butter.

LUNCH: (Midway between dinner and supper) Milk or buttermilk, or eggnog.

SUPPER: Strained cereal with cream, one egg (soft cooked) strained fruit or custard or gelatine, cocoa, toast and butter.

LUNCH: (Before retiring). Glass of milk, warm or cold. As troubles of many kinds are due to constipation we must know how to avoid this. When the system becomes clogged with waste material of which it is unable to dispose the poison is carried all over the body. Constipation may be due to a faulty diet or to some other cause, but in most cases a carefully regulated diet will give needed relief. Diet is of far more value in these cases than a medicinal treatment given for any length of time. The cathartic taken constantly soon loses its value and a person is just where he was when he started, whereas food exerts the tonic effect needed, furnishes bulk to aid increased digestive secretion and peristalsis and thus enables the bowels to act normally in carrying off waste materials. Some foods which are particularly valuable for this purpose are given in the following list:

Fruits—Prunes, figs, dates, apples, oranges, berries.
Vegetables—Cabbage, cauliflower, spinach, lettuce, onions, celery, tomatoes, carrots, peas.
Bread—Graham, bran, or corn bread.
Fats—Cream, butter, olive oil, and bacon.
Fluids—Water, grape juice, buttermilk, coffee and sweet cider.

Honey and marmalades are also good. As meat and meat products are neutral in action, any fresh meat or meat product may be used with these foods to aid in the preparation of the dietary. Water should be taken very freely and is better when taken into an empty stomach. Foods to be avoided are boiled milk, cheese, tea, cocoa and chocolate, tapioca, eggs, salted fish or meats, pastry, spices and highly seasoned or fried foods.

Diarrhea is another very serious intestinal disorder. Whatever its cause, it must be checked as soon as possible as it greatly weakens anyone. Food is very important used with or without medicinal treatment according to the nature of the case. The physician in charge of the case outlines the treatment. Foods which are contraindicated in cases of dysentery and diarrhea are all coarse vegetables, fruits, and sweets. Sometimes it is necessary to withhold food entirely for a short time. Food is then added slowly. Broths, barley or rice gruel are usually given first. Then if milk is well borne it is given diluted with cereal or lime water. Malted milk is also useful. Oatmeal should not be used as it is laxative. The return to a normal diet should be gradual in order that the attack shall not be repeated.

Many people are troubled greatly with flatulence. This is caused by the presence of abnormal gases in the intestines. These press upwards against the diaphragm and sometimes hinder respiration. This often gives the patient a feeling of suffocation resulting from distress in breathing. The heart is sometimes crowded out of place and palpitation and attending discomfort follows. In order to avoid this these people should not eat any food which is apt to increase the gas normally found in the intestines. Foods to be avoided are cabbage, cauliflower, onions, beans and peas, fried and greasy foods, sweets or poorly cooked carbohydrate foods. Small meals at regular intervals should be eaten.

Study Helps

What two processes must foods undergo before they can be assimilated?

Name three secretions that aid in digestion and tell where each comes in contact with the food.

Give some common causes of indigestion.

When is a high protein diet given to a patient with stomach trouble?

Name some easily digested foods.

Give three rules that all sufferers from stomach trouble should observe.

What two things are essential in the successful treatment of gastric ulcer?

Plan one meal for a patient on a gastro-intestinal diet.

Name some foods that are good for the relief of constipation.

What foods should be avoided in diarrhea?

Why do people prone to flatulence need a specially regulated diet?

CHAPTER XVI

DIET IN FEVERS

Outline.—

- Diet in Fevers in General.
  - Rules for Feeding.
    - Fluid Needs.
    - Diet Lists.
- Scarlet Fever.
  - Low Protein Diet.
  - Milk Diet.
- Typhoid Fever.
  - High Carbohydrate Diets.
  - Milk Diet.
  - High Caloric Diets.
  - Diet for Children.
  - Diet in Convalescence.

The diet in fever today is as different as anything could possibly be from the diet of fifty years ago. The old method of feeding a fever was a starvation plan. Today we know that a diet heavier in food value than the normal is essential. The high temperature accompanying most fevers causes tissue waste to be very greatly increased. Unless sufficient food is given to make good this lack, the body tissue of the patient will be burned and emaciation and loss of strength will result. In fevers of short duration even with very high temperature feeding is much easier than in long continued ones. Usually the appetite of the patient is exceedingly poor. In fevers extending over a period of several weeks very often the patient must be coaxed to eat and sometimes it is necessary to resort to forced feeding. These measures are unnecessary in short fevers, for even if the patient does refuse to eat and loss of weight results, convalescence is usually very rapid and the patient soon recovers his lost flesh. In all fevers, thirst is usually great and it is very important that the patient receive plenty of fluids. Formerly most physicians gave nothing but fluid diet to fever patients. In some cases we still find this necessary, but in the majority of instances semisolid bland foods are given also. Small amounts of food should be given at frequent intervals. Unless a patient is very emaciated it is not usually best to wake him during the night for feedings. In the daytime the feedings should invariably be given at the time scheduled. Foods of particular value in fever dietaries are milk, cream, fruit juices, broths, beef juice, gelatin, eggs, buttermilk, koumiss, cereal waters and gruels, cocoa, malted milk, custards and junket.

In scarlet fever the kidneys often become affected. In any fever any extra burden is imposed upon these organs on account of the excessive waste which must be eliminated. When this complication occurs, no protein food other than milk should be given during the course of the fever and the return to protein foods should be very gradual. Scarlet fever is a disease of childhood primarily and children seem to develop nephritis much more readily than adults so affected. Many physicians think it advisable to put children who contract scarlet fever upon a milk diet solely and to keep them upon it for several weeks following.

No fever needs such careful dietary management as does typhoid. It is a disease in which the stomach or intestinal walls or both are ulcerated and any food which tends to irritate these surfaces will increase the temperature and discomfort of the patient. Sometimes the ulcers are very deep and improper foods may cause them to rupture and to let the contents of the intestine into the peritoneal cavity, or may cause a hemorrhage. Both of these will greatly endanger the life of the patient. Foods which cause excessive fermentation in the intestines resulting in flatulence are dangerous for the same reason.

Physicians acknowledge that the successful treatment of a severe case of typhoid is especially dependent upon two things; proper feeding and careful nursing. The physician may do his part in the treatment of this disease perfectly, but carelessness in either of the two essentials mentioned may mean the life of the patient. During the course of high temperature which usually accompanies this disease digestive secretions are poor in quality and insufficient in quantity, circulation is poor, absorption and elimination are abnormal, and the liver is sluggish in action. A large amount of fluids must be given to aid the body in getting rid of the excessive amount of waste. During the course of the fever unless foods are given to spare the tissues of the body, the loss of flesh will be very great. Gelatin, fats, and carbohydrates are important tissue sparers. Although they will not build tissue, they will furnish material to supply heat and energy and thus body protein is spared. Coleman has used very successfully a high carbohydrate diet in which large quantities of lactose are given. Some physicians object to this because they think that such large quantities of milk sugar are apt to cause digestive disturbances. This might be true in some cases and not in others. No two cases of typhoid fever act just alike. In Coleman's diets the patient is given as many calories as possible in carbohydrate form. Milk, cream, and eggs are used with lactose.

Some physicians still think that a milk diet is the best for typhoid fever. In order to give a patient the needed nourishment he would need to take from one to three quarts of milk daily. Some may be able to do this but many can not digest more than from one to three pints. Many people tire readily of milk when used for any length of time. It is constipating to many patients and flatulence may result from it and this is very injurious to the patient.

Within recent years many physicians have been extremely successful in treatment of typhoid with a high caloric diet in which considerable variety in diet is given. This diet seems to satisfy the patient and to meet all of his requirements in every way. The patient so fed is often better nourished at the end of a siege of typhoid than he was in the beginning. All foods are carefully prepared and only measures or weighed amounts are given. The following diet has been used very successfully in the treatment of many cases of typhoid during the past three years:

HIGH CALORIC FEVER DIET

8 A. M. Strained gruel 100 gm. with 2 oz. cream, 1 soft cooked egg, 1 slice toast well moistened, 10 gm. butter, 6 oz. cocoa.

10 A. M. Milk 4 oz. with 2 oz. cream.

12 M. Cream soup 200 c.c.; toast, 1 slice, well moistened; butter 10 gm.; gelatine 3 oz.; cocoa 6 oz.

2 P. M. Eggnog (1 egg and 4 oz. milk).

4 P. M. Junket or soft pudding.

6 P. M. Strained gruel 100 gms. with 2 oz. cream; 1 soft cooked egg; 1 slice toast, well moistened; 10 gms. butter; custard 3 oz.; cocoa 6 oz.

8 P. M. Milk 4 oz. with 2 oz. cream.

12 P. M. Milk 4 oz. with 2 oz. cream; strained gruel with 2 oz. cream.

4 A. M. Milk 4 oz. with 2 oz. cream.

6 A. M. Milk 4 oz. with 2 oz. cream.

NOTE. Night feedings are not given if patient is asleep, as he should not be wakened unless absolutely necessary.

In this disease, as in all others, it is impossible to take any diet list and say that all patients can be fed from it. That would not be true. Certain foods will not agree in many instances and substitutions will have to be made. Personal peculiarities of different individuals will often have to be heeded. If food which is positively objectionable is forced upon a patient more harm than good may often be done. In many cases milk disagrees. Sometimes it can be modified by dilution with lime or cereal waters. Sometimes it must be peptonized. At other times its use is absolutely impossible in any form and other fluids or semisolid foods must be used instead.

When typhoid occurs in children the feeding may be similar to that given adults, unless the child is very young. When the child is under five years of age, it is best to feed milk entirely if possible.

HIGH CALORIC FEVER DIET, CHILD, 12 YEARS OF AGE

4 A. M.	Milk 3 oz. with cream 1 oz	116	calories
6 A. M.	Milk 3 oz. with cream 1 oz	116	"
8 A. M.	Strained gruel 2 oz. with cream 1 oz	90	"
	1 soft cooked egg	60	"
	1 slice toast, well moistened	73	"
	10 gms. butter	72	"
	Cocoa 4 oz.	104	"
10 A. M.	Milk 3 oz. with cream 1 oz	116	"
12 M.	Cream soup 4 oz	160	"
	1 slice toast, well moistened	73	"
	10 gms. butter	72	"
	Cocoa 4 oz.	104	"
2 P. M.	Eggnog (1 egg with 3 oz. milk)	116	"
4 P. M.	Junket or soft pudding 3 oz	106	"
6 P. M.	Strained gruel 2 oz. with 1 oz. cream	90	"
	1 soft cooked egg	60	"
	1 slice toast, well moistened	73	"
	60 gms. custard	80	"
	10 gms. butter	72	"
	Cocoa 4 oz.	104	"
8 P. M.	Milk 3 oz. with cream 1 oz	116	"
12 P. M.	Milk 3 oz. with cream 1 oz	116	"
	Strained gruel 2 oz. with cream 1 oz	90	"

The return to normal diet should be very slow as relapses are apt to occur very readily and they are often fatal. The appetite of the patient is not a safe guide at this time. It is usually abnormal and the patient thinks of food only and not of any danger that may come to him as a result of indiscreet eating. For a long time after the patient is well enough to be around again he must be told that he must not eat raw foods of any kind, coarse vegetables, or heavy indigestible meats. He must not eat fried foods, pastry, fresh bread, pickles or highly seasoned foods of any kinds. He should live upon milk, eggs, stewed fruits without skins or seeds, well cooked cereals, stewed vegetables (spinach, peas, asparagus, carrots,) butter, cream, potatoes, plain soups, soft puddings, and easily digested meats. His diet should be such that little residue is left in the intestines.

Study Helps

Why should a fever patient receive a high caloric diet?

When should a scarlet fever patient receive a low protein diet?

Name three tissue sparers.

Why is diet so important in typhoid fever.

What is lactose?

Give two objections to milk as the sole article of diet in typhoid fever.

Why should the diet of the convalescent typhoid be carefully planned?

Of what value are fats in fever diets?

Name six foods that you consider valuable for fever patients.

Why are raw fruits and vegetables forbidden in the diet of a convalescent typhoid?

CHAPTER XVII

DIET IN ANEMIA AND IN TUBERCULOSIS

Outline.—

- **Diet in Anemia.**
  - **Proper Foods and Their Preparation.**
  - **Diet List.**
- **Diet in Tuberculosis.**
  - **In Acute Stages.**
  - **Among the Poor.**
  - **Valuable Foods.**
  - **Dietary Rules.**

DIET IN ANEMIA

The value of dietetic treatment in anemia depends upon the nature of the disease. There are several kinds of anemia. It may be due to lack of proper food, to hemorrhage, or secondary to some other disease. Recovery after hemorrhage, in cases of no organic disease, is very rapid when food is well chosen. Anemia is a deficiency of red cells and hemoglobin in the blood. Poor blood can not build tissue or keep the body tissue in good condition. It can not oxidize properly the absorbed food material and so assimilation of the ingested food is hindered. This disease must be treated by rest, plenty of fresh air and sunshine, and good, nutritious, easily digested food. The foods must be simply cooked as the digestive secretions are poor and improper foods may cause functional disturbances which will aggravate the anemic condition.

Foods of especially great value for this disease must be rich in iron and other mineral salts. If the patient is thin and poorly nourished he should be given as much fat as he can use to advantage. Cream, butter, olive oil, and bacon are easily digested fats that are quickly available for body use. Other foods which are particularly useful in the dietetic treatment of anemia are red meats, eggs, milk, green vegetables and fresh fruits.

The appetite of a patient with this disease is often very capricious or else it is lacking entirely. It is necessary to humor the personal peculiarities of an individual very often, but in as far as possible, he should be urged to take these foods in some form. The preparation of various articles of diet may be varied greatly so that the food will not become monotonous. Scraped beef is a very good food for one with impoverished blood, but if it is served to the patient in the same form continually he will tire of it and will soon refuse to eat it. The scraped beef may be used in sandwiches, soup, or in any other way agreeable to the patient. The meals should be small and frequent. The following list will serve as a general guide for these patients:

Diet for Anemia

Meats—Rare or raw scraped beef, roast beef, lamb chops, roast lamb, ham, bacon, fowl, and fresh fish of any kind.
Eggs—In any form except fried.
Vegetables—Potatoes, string beans, spinach, peas, carrots, celery, lettuce, tomatoes, asparagus.
Fruits—All fresh fruits (raw or cooked).
Cereals—All kinds.
Fluids.—Milk, buttermilk, fruit juices, cream, cocoa, malted milk.
Fats—Butter, olive oil, cream, bacon.
Desserts—All simple and easily digested puddings.
Bread—Wheat, rye, corn (not less than one day old).
Soups—Cream soups or meat soups.
Avoid. Fried foods, fresh bread, pastry, confectionery, vinegar, pickles, canned or dried or salted foods.

DIET IN TUBERCULOSIS

Diet in tuberculosis is of the greatest importance. Rest, fresh air, and diet are of much more value in this disease than any medication. The diet depends entirely upon the condition of the patient. In the early stages of the disease when there are no gastric disturbances diet is most effective. In advanced cases or when there are high temperatures the general diet rules given for the treatment of fevers must be observed. The patient at this time is usually able to take nothing but fluids and semisolids. The aim in every instance must be to give a maximum of nourishment with a minimum of effort to the patient and his weakened digestive system. Malnutrition aids in the progress of the disease. It is sometimes a hard problem to treat tuberculosis among the poorer classes of people. The foods which they need are often impossible to obtain. Careful substitution of cheaper foods with equal food value must be planned.

The appetite of tubercular people differs. Some are able to eat heartily most of the time and to utilize all that they take. Others have little or no appetite and can hardly be induced to eat, no matter how attractively the food is cooked and served. Each case must have individual care and treatment. Any good, nutritious, easily digested food is valuable for the tubercular patient.

Foods of exceptional value are milk, eggs, red meats, cereals, cream, butter, olive oil, cod liver oil, fresh fruit and vegetables and malt preparations. Tea and coffee are not harmful to most patients if taken in moderation. If served with plenty of cream they help to furnish needed fat in a highly nutritious form. Food should be given as frequently as the needs of the patient demand, but the hours for meals and lunches should be at regular intervals and the schedule should be kept the same each day. No eating between meals should be allowed. Candy and sweets blunt the appetite for better and more needed foods.

Study Helps

What food nutrient is especially needed in anemia?
How may it be supplied to the individual needing it?
Name some foods valuable for anemic people.
Why should the food be simply cooked?
In what cases of anemia are fats particularly valuable?
What foods are best for tubercular patients?
Why are milk and eggs valuable in tuberculosis?
Give some objections to eating between scheduled meal hours.
Name two things which must be used with diet in treatment of tuberculosis.

CHAPTER XVIII

DIET IN LIVER DISTURBANCES, RHEUMATISM, GOUT, AND OBESITY

Outline.—

- **Diet in Liver Disturbances.**
    - **Functions of Liver.**
    - **Irritating Substances.**
    - **Diet in Acute Disease.**
    - **"Fat Free" or "Low Fat" Diet.**
- **Diet in Rheumatism.**
- **Diet in Gout.**
    - **Excess of Uric Acid.**
    - **Restriction of Sweets.**
    - **Limited Fats.**
    - **Purin Free Diet.**
- **Diet in Obesity.**
    - **According to the Cause.**
    - **Some Systems of Diet.**
        - **Oertal's System.**
        - **Erbstein Diet Plan.**
        - **Banting System.**
    - **General Rules for Dieting.**

DIET IN LIVER DISTURBANCES

The liver is the store house of the body. Its work in nutrition is most important. It changes surplus carbohydrate into glycogen and stores it for future use. It secretes the bile. It helps take care of the waste of the body. Diseases of the liver are usually difficult to diet. When the liver is overworked the person becomes bilious. Usually a saline cathartic and a light diet for a few days will straighten out the trouble. Repeated attacks resulting from continued overfeeding may become serious after a time. Certain foods are irritating to the liver and should be avoided when it is not functioning well.

Some of these are spices, condiments, meat extracts, onions, peppers, strong tea and coffee. Alcohol should never be used. It often causes functional derangements so it can not fail to harm the liver when it is diseased. Fats and sugars must often be restricted or forbidden entirely.

In acute diseases of the liver or gallbladder a much more limited diet must be given during attacks. Sometimes there are high temperatures and only light, fat-free fluids can be taken for some time. After these attacks food should be added very slowly. Large quantities of fluid are valuable as they tend to prevent constipation. In some cases milk must be avoided on account of gastric complications.

There are so many diseased conditions of the liver and gallbladder that each case will have to be dieted according to the individuals, but the following list will show what foods are of greatest value in treatment of these diseases:

FAT-FREE DIET

Soups—Stock soups, meat broths, from which all fat has been removed.
Vegetables—Fresh and cooked (except peas, carrots and sweet vegetables); potato, baked or boiled, once daily.
Fruits—Oranges, lemons, grapefruit and unsweetened acid fruits.
Cereals—Wheat, barley and rice cereals; sago and tapioca.
Fluids—Water, orange and lemonade; whey or skimmed milk sometimes allowed; weak tea or coffee.
Breads—White bread, graham, rye, toast.
Meats—Lean beef, lamb, chicken or squab, white or lean fish, once daily.
Desserts—Acid fruit gelatines and fruits.

Avoid—Fats and oils of all kinds; mutton, liver, calves brains, viscera of animals; egg yolks; sweet fruits; peas, carrots, onions, radishes, peppers, water cress; cheese.

Limit—Starches and sugars; milk; meat to once daily; use salt in moderation; potato once daily.

DIET IN RHEUMATISM

At one time it was thought that errors in diet were in a measure responsible for some cases of rheumatism. Today we do not believe this to be true. Rheumatism is a disease resulting from acute or chronic infection in some part of the body. Diet in this disease, except during an acute attack is only valuable in that it is able to build up for the patient a better resistance to combat the infection. Plenty of good, well-cooked cereals, vegetables, and fresh fruits are valuable. Meats should not be excluded from the diet in all cases but they are better used very moderately. During an acute attack the patient is usually given a milk diet. If milk can not be taken other fluids are substituted. During convalescence farinaceous foods are added slowly. Sweet foods should be avoided.

DIET IN GOUT

Gout is a disease of metabolism, usually caused by overeating. It may be acute or chronic. Children sometimes inherit a tendency to develop this disease upon very slight provocation. When this is true the carbohydrate intake of children should be materially decreased. They should not be allowed to eat much confectionery or sweets of any kinds as these foods are always harmful in this disease. They increase the work of the already overworked digestive system and cause it to become clogged with waste matter which can not be oxidized. This produces an excess of uric acid in the blood and an attack of gout usually follows.

It is often necessary to restrict fats very materially, but great care must be taken that the patient does not become so undernourished that his vitality is seriously lowered. This would only defeat the intent of the dietary treatment as the patient with a low resistance responds poorly to any kind of treatment. When the patient is obese he is able to stand a greater reduction than the thin, anemic individual.

Foods rich in purin bodies should also be avoided by gouty subjects and by sufferers from rheumatism. Foods which produce these substances are meats and meat products, peas, beans, oatmeal, and tea and coffee. The diet for gout must always be carefully regulated by a physician. During acute attacks it is usually best to restrict the diet to fluids and light farinaceous foods. Normal diet, or the diet upon which the patient does best, is resumed very slowly.

The following list of foods is low in purin bodies and affords great variety from which to choose in menu building for patients with gout or rheumatism:

PURIN-FREE DIET (LOW IN PURINS)

Soups—Cream soups flavored with cauliflower, carrots, corn, celery, tomatoes.
Vegetables—Cauliflower, cabbage, Brussels sprouts, carrots, lettuce, celery, tomatoes, mushrooms, water cress, beets, squash, cucumbers, eggplant, parsnips, potatoes.
Fruits—All fresh and stewed fruits.
Fats—Butter, cream, olive oil, fat bacon.
Cereals—Wheat, corn, rice, cereals, macaroni, spaghetti.

Desserts—Simple pudding, tapioca, rice, sago, cornstarch, custards.

Eggs—In any form except hard boiled; 2 to 3 daily.

Fluids—Milk, cocoa, water, lemonade or orangeade, buttermilk.

Breads—White, graham, rye or cornbread, toast or zweibach.

Cheese—Cream cheeses, cottage cheese.

Avoid.—All flesh foods; broths, sauces, gravies made from meats; peas, beans, lentils; oatmeal, tea, coffee, malt liquors. Use sparingly asparagus, onions and spinach.

DIET IN OBESITY

Successful dietary treatment for obesity is probably as much sought and is needed as much as it is desired in many cases. So little discretion and common sense is used by many people attempting to diet that more harm than good results. The treatment for obesity by ancient peoples was excessive purgation, sweating, abstinence from fluids, and starvation. These methods were too rigorous and of little value. The regulation of the quantity and quality of food eaten and some systems of exercise have done more to relieve the obese than all other methods. Medication, except in cases of complication with other diseases, is of little value. No diet system or exercise regime can be given that all obese people can use. Some people are benefited more by restricting the quantity of food which they eat regardless of the quality. Others are able to eat whatever they wish of certain foods if they eliminate others from their diet. The needs of each individual must determine this. Some people find it almost impossible to reduce their weight upon any diet and for others it is absolutely dangerous to attempt to reduce. They may cause troubles which are worse than obesity.

When obesity is hereditary, reduction in weight is less successful than when the condition is a result of overeating. Young people usually yield to treatment with greater ease than older ones. Continual indulgence in alcoholic beverages is responsible for some cases. Dieting for these people is imperative, as the fat is usually accumulated around the heart or other organs so that functional derangement occurs. The use of alcohol must be discontinued before dieting will do any good. These people should not attempt to diet without the careful supervision of a physician. In most cases it is inadvisable for obese people to attempt to regulate their own diet without expert advice.

Many systems of dietary treatment have been in use for a long time. Some are valuable in some cases, others are too severe for most people. Whatever system or method is used, the patient should be taught to eat slowly and to masticate his food very thoroughly. This tends to satisfy the appetite more quickly and less food is needed. It is best to take little or no fluid with meals. Foods which excite excessive thirst should be avoided.

The Oertal system for dieting reduces fluids, fats, and carbohydrates, and gives a high protein allowance. On this diet the patient receives about twice the normal amount of protein, about one-fourth to one-half amount of fat, and about one-fourth the usual carbohydrate allowance. If the patient is able, he is made to exercise a certain amount daily. If unable to do this, Oertal seeks by baths and massage to obtain the same results.

The Erbstein diet plan has been used successfully in some cases. He allows practically a normal amount of fat and protein but he limits carbohydrate foods to one-tenth the normal allowance. Erbstein thinks that by giving plenty of fats he can satisfy the appetite of the patient so much more readily that a greatly decreased quantity of food will be eaten. Many authorities do not agree with this, as various experiments along this line have failed to prove this.

The Banting system of diet is too severe for most people. He advocates a practical elimination of fatty foods, a maximum of one-sixth of the normal carbohydrate allowance, and twice the amount of protein foods given to normal individuals. This is a starvation system and malnutrition is sure to develop if this is continued for any length of time.

The diet of any obese patient should be regulated by a physician. He will consider the physical condition of his patient and his habits or occupation. A rapid reduction of weight is almost never advisable. It is much safer for a patient to lose one or two pounds weekly than to lose ten pounds in a few days. Rapid reduction places too great a strain upon the heart and kidneys.

The diet for people who wish to gain weight should be high in those foods which the obese must avoid. Overeating will not accomplish this in all cases. We often say that some people eat so much that it makes them thin to carry it and this is often literally true. Sugars and starches are fat producing foods. Some people are thin by heredity and diet seems to influence their weight very little. If they are well this does not matter at all. Overwork and mental strain will keep many people thin.

Sane living and proper diet are necessary to keep all people in health so that they may attain their maximum efficiency.

Study Helps

Why is diet valuable in rheumatism?
When is a milk diet valuable?
What foods should be avoided?
What foods should be limited?
How may food cause gout?
What foods are particularly harmful?
Name some foods rich in purin substances.
Give some dangers of indiscriminate dieting in obesity.
Why is alcohol harmful in obesity?
Which is better, rapid or gradual reduction in weight? Why?
Give the names of some well-known systems of diet for obesity.
How may we determine the best system for any patient?
How will slow eating aid in this disease?
What foods are good for increasing weight?

CHAPTER XIX

DIET IN SKIN DISEASES AND SCURVY

Outline.—

- **Causes of Some Skin Diseases.**
    - **(a) Errors in Diet.**
    - **(b) Faulty Metabolism.**
    - **(c) Poorly Arranged Dietary.**
- **I. Urticaria.**
    - **(a) Origin.**
    - **(b) Dietetic Treatment.**
- **II. Acne.**
- **III. Eczema.**
    - **(a) In Infants.**
- **IV. Skin Eruptions Secondary to Other Diseases.**
    - **(a) Tubercular Lesions.**
    - **(b) Chronic Undernutrition.**
    - **General Dietary Rules.**
    - **Foods to be Avoided.**
- **Diet in Scurvy.**
    - **Common Causes of Scurvy.**
        - **1. Improper Food.**
        - **2. Lack of Salts.**
    - **Scurvy Among Soldiers and Sailors.**
        - **1. Corrective Measures.**
    - **Scurvy Among the Poor.**
        - **1. Lack of Proper Food.**
            - **(a) Ignorance.**
            - **(b) Habit.**
            - **(c) Corrective Measures.**

DIET IN SKIN DISEASES

As many skin diseases may be caused directly by errors in diet or by the imperfect digestion and assimilation of certain foods, the dietetic treatment of them is important. They may be caused by overeating or by undereating. They may be due to a lack of some particular food in the diet, or they may be due to an overindulgence in some other food. No two people are ever exactly alike in every way, nor can any two people be treated in exactly the same manner even if the disease with which they are affected seems to be the same. Fats may be the offending element in one case and sweets in another. The physician carefully studies his patient and determines in this way the individual needs of each case and the things which must be avoided.

Some skin diseases can be benefited very readily by simple diet regulations. Others yield very poorly to any dietetic or medicinal regime. Nevertheless if the patient will adapt himself to a regular routine in the arrangement of his habits of eating and will eliminate from his diet entirely all rich, greasy and indigestible foods, he will be able to improve his condition in the majority of cases. It is also very important that constipation be avoided.

Urticaria or hives, acne, and eczema are skin diseases which have been very successfully treated by diet in many instances. Severe cases of urticaria have been traced directly to the eating of strawberries or shellfish. In these cases the problem is very simple as the elimination of the offending article from the diet will clear up the trouble. The patient with this disease is usually so uncomfortable that he is glad to follow instructions and to let the offending food strictly alone.

Some skin eruptions are due to too much fat in the diet. Some are due to the protein or the carbohydrates eaten. Various tests and analyses of the blood, enzymes, urine, and stools are valuable in aiding the physician in his study of these cases. In some cases of persistent skin eruptions yeast has been given to patients in prescribed portions daily with very good results. The yeast increases the fermentation in the intestines which checks bacterial putrefaction of some foods, especially proteins. Some forms of eczema are benefited by the adoption of a low protein diet. Acne is sometimes due to a diet too high in fat and when the necessary change in diet is made many cases are cured. Eczema in infants is commonly due to dietetic errors. It is very common in children between six and eighteen months of age. It may be the direct result of over or underfeeding. The use of many proprietary foods without the addition of milk may be the contributing cause. Even breast-fed babies may be afflicted if the mother's milk is not right. It may be too rich or it may be too thin. The physician in charge of the case makes the necessary changes in feeding and the eruption usually disappears.

In the crowded, ill-ventilated tenement districts, where many people exist in a half famished condition, much skin disease is found. It may be the outcome of other diseased conditions or it may be due to a state of chronic undernutrition. Visiting nurses and dietitians are able to benefit these people by improving the conditions surrounding them, by teaching them how to take care of themselves and by showing them how to spend their small food allowance so that they may obtain the best possible value for it.

Some cases are due to tuberculosis. These persons need a carefully supervised nutritious diet. The lack of proper food encourages the advance of tubercular trouble and lesions on the skin surface do not heal.

It is impossible to give any diet list which will be of much value for skin diseases, but a few general principles are valuable. Food should be taken at regular intervals and at regular hours. Promiscuous eating between meals is always to be avoided. All food should be simply cooked and seasoned. It is very important that everything eaten should be thoroughly masticated and well mixed with the saliva before swallowing. Some things which should be avoided by people with skin diseases are fried foods, pastries or cake, candy, hot bread or pancakes, pickles, spices or alcoholic beverages. Sometimes it is necessary to eliminate other foods but these restrictions must be made according to the need of the individual.

DIET IN SCORBUTUS OR SCURVY

Scurvy is a disease due to malnutrition. As it usually follows a lack of fresh food in the diet, it is thought that the deprivation of the salts and organic acids found in fruits and vegetables is responsible for the disease. It is due to error in diet and when the error is corrected the disease is cured if it has not progressed too far. In the Civil War, when it was impossible to obtain proper food for the soldiers many died from this disease. In the Crimean war there were 2300 cases among the French soldiers alone (Thompson). Soldiers and sailors, when unable to obtain the right food, have suffered very greatly from scurvy. The use of canned and compressed vegetables, fruits and meats for soldiers and sailors has greatly lessened the danger of this disease among them.

If the soldiers are obliged to live for any length of time upon bacon, hard tack and coffee, there are usually many cases of scurvy in the army.

Scurvy is sometimes found among our undernourished poor people. Their diet is often underbalanced or poorly regulated, more through ignorance than from poverty. Education of the people is overcoming much of this. The children coming home from school are able to help their ignorant parents. However, scurvy among infants is by no means limited to the poorer classes. It may be found among the very wealthy who have plenty of money to buy proprietary foods for infant feeding. Many of these foods are very good if used with milk and other foods; most of them are too high in carbohydrate in proportion to other nutrients to be used alone. Milk, orange juice and sometimes beef juice should supplement these foods.

Study Helps

Give two common causes of some skin diseases.

Name some skin diseases that may be caused by errors in diet.

What is urticaria?

Why is a low protein diet sometimes valuable?

To what is eczema in infants often due?

Why is it inadvisable to use most proprietary foods without milk for infants?

Give some foods which people with skin diseases should avoid.

Why should one eat at regular intervals every day?

Why should food be well masticated?

What is scurvy?

How can scurvy be avoided in most cases?

What people are most apt to suffer from scurvy?

Is scurvy as common today as it was fifty years ago? Why not?

CHAPTER XX

"PRE-" and "POST-" OPERATIVE DIETS

Outline.—

- **Diet Preceding Surgical Operation.**
- **Post-operative Diets.**
  - **Following General Anesthesia.**
    - **Laparotomies.**
    - **Appendectomy.**
    - **Gallbladder and Liver Cases.**
    - **Stomach Operations.**
    - **Complications.**
  - **Diet After Local Anesthesia.**
- **Convalescent Diet.**

It is very essential that nurses should understand something of the importance of proper diet in surgical as well as in medical cases. An error in diet may be responsible for a tardy convalescence after a successful operation; it may even cost the life of a patient. In some cases it is not only advisable but it is absolutely necessary that the diet of a patient, who must undergo an operation, be carefully planned before the surgeon will consent to operate. A person having diabetes should, if possible, follow a rigid diet regime preceding any surgical operation in order to free the urine from sugar. A wound will not heal well otherwise. Some people are in such poor physical condition when the need for surgical interference occurs that they should be given especially prepared and nutritious foods in order to give them more strength to stand the operation.

However, in the majority of surgical cases no opportunity for dieting is given. The patient comes into the hospital only a few hours before he is to be operated. If he is to receive a general anesthetic it is best for him to receive no food for from six to twelve hours before he is to go to the operating room. Some surgeons even desire the patient to take only very light foods during the previous day; but no rule as to this procedure can be given because there is such a diversity of opinion. All agree, however, that it is better for both patient and surgeon if the stomach is entirely empty at the time of operation. There is much less danger of nausea and vomiting. Usually a cathartic and an enema are given so that there will be little residue in the entire alimentary canal. Sometimes it is necessary to empty the stomach by an emetic or a stomach pump when the patient enters the hospital as an emergency.

The diet which a patient receives after an operation will depend upon the nature of the operation and the condition of the patient. Too much food will do more harm than too little at this time. In most cases when a patient has received ether or chloroform the stomach is usually given a complete rest from food for twelve to twenty-four hours. The diet is generally supervised by the surgeon in charge, but he does not always designate exactly what foods he wishes his patient to have. Sometimes the nurse is told to give only fluids for a time, sometimes semisolid, easily digested foods are given. In any case it is well for the nurse to know the foods which may be given under different classes. It is well for the nurse to know that in cases of persistent vomiting she must avoid certain foods and still give nourishment to sustain the strength of her patient. Sometimes it is best to abstain from food entirely for a time. Forced feeding is inadvisable in these cases. Oftentimes milk can not be retained; then we must resort to other things, as white of egg, broths, koumiss, cereal waters and gruels, tea.

After laparotomies usually no food is given by mouth for twenty-four hours. Then food is added very slowly. The condition of the patient is the surgeon's guide. If the patient has lost much blood it is necessary to force liquids sometimes in order to restore the fluid content of the body as soon as possible. After appendectomies without complications, liquids are usually given on the second day after the operation, semisolid foods or a light soft diet on the third day, soft diet for a few days following, and gradually normal diet is resumed. Sometimes the diet must be limited to certain very soft foods for weeks. This is usually true in cases of appendicitis in which there has been considerable pus in the peritoneal cavity. In all cases food for which patients have a positive dislike or which do not agree with them should be avoided in planning the convalescent's diet. Fats and heavy carbohydrate foods should be avoided or used sparingly in cases where operations have been performed upon the gallbladder or the liver. When operations are performed upon the stomach the patient is usually fed by rectal enemata for several days. Food by mouth is given very slowly.

Sometimes surgical cases are complicated by high temperatures. In these cases each patient is a law unto himself and all that we can do is to give the most easily digested, most highly nutritious foods in the simplest forms that can be taken and retained. As high fever destroys body tissue rapidly, we try to give foods which will make good the loss or spare the tissues by furnishing surplus fuel.

Much surgery is done under local anesthesia. In many cases following such an operation the patient is able to eat any easily digested nutritious food. Such patients may suffer more from hunger than from the operation, if deprived of food. Exceptions to this are cases in which the throat or face have been operated upon. In cases where it is difficult for a patient to swallow or to chew his food only fluids or semisolid foods should be given. After the removal of the tonsils a cool, soft diet is usually given; although some surgeons do not follow this rule absolutely. Oatmeal gruels, gelatins, ice-cream and milk are some foods which are easiest swallowed at first. Later soft cooked eggs, custards, milk toast, cocoa and cereals are given. The return to solid food is gradual. By the end of the first week most patients are able to eat any soft food and to go back to a normal diet by the end of another.

Very often it is necessary to coax the appetite of the operative during convalescence. The appetite of some has been capricious previously, or following the shock of the operation and the enforced inactivity the desire for food has been lost. These cases need careful attention. If the patient is not urged he will often send away his tray without touching food. This must not be allowed or the patient will suffer more from inanition than from the operation and his recovery will be seriously hindered. An attractively prepared tray and a little attention from the nurse at meal times is essential in these cases.

Study Helps

When is it advisable to give a special diet to a person who must be operated?

Why should the stomach be empty when ether or chloroform are given?

What are nutrient enemata? Name some.

After what operation should little or no fat be given? Why?

What diet is usually given after the removal of tonsils?

Give general rule as to diet after laparotomy.

In what ways may food be harmful following operations?

APPENDIX

Test Meals

EWALD'S TEST BREAKFAST—

One or two white rolls or two slices of toast (2 oz.) with 10 oz. of tea or water.

LEUBE'S TEST DINNER—

About 12 oz. of clear meat soup; about 7 oz. of beefsteak; about 2 slices of white bread (2 oz.); about 7 oz. of water.

Modifications of this diet are used by some physicians which reduce the amount of meat and soup about one-half.

MOSENTHAL TEST DIET (SALTLESS)—

8 A. M.	Oatmeal	100 gm.	about 3½ oz.
	Milk	30 c.c.	1 "
	Sugar	2 tp.	
	Coffee	160 c.c.	5½ "
	Milk	40 "	1½ "
	Sugar	1 tp.	
	Bread	60 gm.	2 "
	Butter	20 "	⅔ "
	Water	200 c.c.	7 "
	Milk	200 "	7 "
	Salt	3 gm.	
12 M.	Meat soup	180 c.c.	6 "
	Beefsteak	100 gm.	3½ "
	Potato	130 "	4 "
	Green vegetable	100 "	3½ "
	Green salad	50 "	2 "
	Bread	60 "	2 "
	Butter	20 "	⅔ "
	Pudding	110 "	4 "
	Tea	180 c.c.	6 "
	Milk	20 "	⅔ "

	Sugar	1 tp.	
	Water	250 c.c.	8 “
	Salt	3 gm.	
6 P. M.	Eggs 2		
	Bread	60 gm.	2 “
	Butter	20 “	⅔ “
	Stewed fruit	100 “	3½ “
	Tea	180 c.c.	6 “
	Milk	20 “	⅔ “
	Sugar	1 tp.	
	Water	300 c.c.	10 “
	Salt	3 gm.	

Food Values of Some Common Foods

FOOD	AMOUNT	CALORIC VALUE
Raw apple	Medium size	70
Bacon	1 average serving	100
Beef broth	4 ounces	12
Beef juice	1 ounce	6
Beef, sirloin	1 serving	200
White bread	1 slice	70
Butter	1 ounce	220
Carrots	1 small	20
Celery	1 serving	6
Cauliflower	1 serving	35
Cottage cheese	1 serving	50
Chicken	1 serving	50
Cocoa	1 teaspoonful	10
Cornmeal	1 cup (8 oz.)	504
Cornstarch	1 tablespoonful	40
Cream (18%)	1 ounce	60
Egg	average size	60
Egg white		12
Egg yolk		48
Flour, wheat	1 cup (8 oz.)	500
Gelatin	1 tablespoonful	80
Grape juice	8 ounces	250
Lemon	1	20
Lettuce	1 serving	6
Malted milk	1 tablespoonful	60

Food	Amount	Caloric Value
Rolled oats	1 cup (uncooked)	282
Olive oil	1 tablespoonful	135
Orange	1 medium	80
Oysters	1 serving (raw)	20
White potatoes	1 serving	80
Sweet potatoes	1 serving	120
Prunes	6 (average size)	120
Rice	1 tablespoonful	50
Spinach	1 serving	25
Sugar	1 tablespoonful	60
Tomatoes	1 medium	16
Tapioca (minute)	1 serving	50
Turkey	1 serving	290
White fish	1 serving	150

GLOSSARY

Absorption. The passing of digested food material into the blood.

Acidosis. Acid poisoning.

Adjunct. An accessory or addition.

Anesthesia. Paralysis of sensibility.

Assimilation. The utilization by the tissues of digested and absorbed foods.

Calcium. Lime salts.

Calorie. The unit of heat measurement of food.

Carbohydrates. Chemical compounds of carbon, hydrogen and oxygen; chiefly sugars and starches.

Coma. A deep sleep from which it is difficult or impossible to arouse one.

Dietetics. The science of correct feeding.

Dietary. A system of diet; pertaining to diet.

Digestion. Changes produced in food by enzyme action in the alimentary canal.

Elimination. Rejection of the waste materials of the body.

Farinaceous. A subdivision of starchy foods; mealy.

Fermentation. A change produced in food by which alcohol and carbon dioxide are formed.

Hyperacidity. An increase of hydrochloric acid in the gastric juice.

Hypoacidity. A decrease of hydrochloric acid in the gastric juice.

Idiosyncrasy. Personal peculiarity.

Inanition. Exhaustion from want of nourishment.

Intracellular. Within the cell.

Koumiss. Fermented milk.

Mastication. The act of chewing.

Metabolism. The changes taking place in the body by the oxidation of food materials building up and tearing down of tissue.

Nutrients. Chemical compounds of which foods are composed.

Nutrition. Nourishment.

Oxidation. Combination with oxygen.

Proteins. Food nutrients containing nitrogen available for body use.

Purin. A protein containing nitrogen in a form called purin bodies.

Putrefaction. A process of decay.

Saline. Containing salt.

Stomatitis. Inflammation of the mucous membrane of the mouth.

Trichina. A parasitic worm.

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